IMPERIAL MYCOLOGICAL
28 JUNE 1941
INSTITUTE

UGANDA PROTECTORATE.

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE.

FOR THE PERIOD

1st January 1939 to 30th June 1940

PRICE: SH. 1/-.

Published by Command of His Excellency the Governor.

ENTEBBE:
PRINTED BY THE GOVERNMENT PRINTER, UGANDA.
1941.

(692)

DEPARTMENT OF AGRICULTURE.

ANNUAL REPORT

For the Period 1st January, 1939, to 30th June, 1940.

FOREWORD.

Arising out of conditions created by the war and the need for economy, it was decided to depart from the usual practice of publishing the Departmental Report in two parts.

Part I of this report gives a review of the agricultural conditions in the Protectorate during the whole of 1939 and the first half of 1940; whilst Part II is devoted to the experimental work carried out during the crop year from the middle of 1939 to the middle of 1940.

It is gratifying to be able to report that despite the disturbed conditions, the essential work of the Department both in the field division and in the laboratories division has been fully maintained.

Soon after the outbreak of hostilities the war-time agricultural policy of the Protectorate, insofar as native agriculture is concerned, was defined as one of aiming at self sufficiency in the matter of food production whilst aiming at the maximum production of cotton and coffee as the major export crops. It is gratifying to record that intensive propaganda to encourage the planting of additional acreages of food crops, to counteract a severe drought and also locust damage in some areas, met with a satisfactory response and that only minor shortages occurred.

During the period under review a policy of rural development centred round a rational view of the measures to be adopted to deal with soil conservation was formulated and unanimously approved by all members of the Department. The steps by which such a policy should be implemented under the varying conditions in the Protectorate have been delegated to the Provincial Senior Agricultural Officers in their respective areas, and it can be recorded that steady progress is now being made.

Two centres, one in the elephant grass, heavy loam areas of Buganda, and the other in the short grass, light soil areas of the Eastern Province have been selected for an intensive effort at Rural Reconstruction under the guidance of Administration and Technical Officers of the two Provinces working as a team, and it is hoped that these concentrated areas will ultimately serve as demonstration units through which the interest of leaders of African thought will be stimulated to the need for such measures in all areas.

Discussions on the proposals of the 1938 Cotton Commission were commenced during 1939, but the outbreak of war made it clear that no good purpose would be served by considering any reorganisation of the industry during the disturbed conditions inevitable during a war period.

The Director of Agriculture was appointed a member of the Supply Board set up at the outbreak of war and subsequently assumed the Chairmanship of the Executive Committee of that Board responsible for control of foodstuffs and trade commodities. These war-time duties have thrown heavy additional work on the Headquarters staff of the Department, more particularly the Statistician, and I should like to record my appreciation of the enthusiasm and efficiency with which such additional work has been carried out.

Finally I would gratefully record the valuable assistance which I have received from the Provincial Administration, public bodies and those individual gentlemen who have given so freely of their time and advice in consideration of matters affecting the general agricultural development of the Protectorate and the special duties connected with the war with which I have been charged.

It is a pleasure to record the loyal and faithful service rendered by all members of the Department during a period of exceptional difficulty.

G. F. CLAY,
Director of Agriculture.

SECTION I.—AGRICULTURE IN THE DEPENDENCY.

Weather Conditions.

The year 1939 will be remembered as one of the driest on record. The total rainfall at Entebbe amounted to only 38 inches as compared with the average of 60 inches. With the exception of part of the Western Province, where normal weather conditions prevailed, the cotton planting season in the main producing districts was a most difficult one. Although good rains were recorded in November, they were followed by a dry season of unusual severity.

Cotton.

1938–39 Crop.—The somewhat conservative view expressed in the Annual Report for 1938 that the cotton crop would not reach the estimate proved to be correct for the growing season was one of light rainfall and unduly long hot periods. Stained cotton had only a nominal value and much of it was retained for domestic use. All these circumstances combined to reduce the amount of cotton marketed and the final figure of 177,913 tons equivalent to 303,893 bales produced from 1,205,480 acres was a substantial drop from the record of the 1937–38 season.

1939–40 Crop.—The planting season was late owing to the necessity of preparing adequate areas of food crops, while rainfall was somewhat erratic during the growing season. However, the early onset of hot and dry weather ripened the crop quickly and favoured the picking of high grade cotton. 176,691 tons of seed cotton were produced from some 1,213,420 acres, equivalent to 296,672 bales, assuming an average ginning outturn of 30%.

Marketing of both seasons' crops proceeded smoothly, a contributing factor undoubtedly being the arrangements made for the transport of seed cotton by a restricted number of lorries with the agreement of the

Ginning Pools, thus avoiding the wild scramble that was an unnecessary feature of marketing in previous seasons.

Coffee.

The 1938–39 crop of Bugishu Arabica coffee was equivalent to 1,822 tons of parchment coffee, a reduction of some 257 tons on the previous year's figure. Some 600,000 young trees were distributed from Native Administration nurseries bringing the total number distributed in Bugishu to date to slightly over 8½ million trees.

1939–40 Crop.—Sales reached the very satisfactory total of 4,156 tons of parchment coffee. Nearly 700,000 trees were distributed and including these plantings the total area under Arabica coffee in Bugishu is estimated to be 8,451 acres. Steps have now been taken to limit distribution from nurseries so that each individual grower has no more than 500 trees. It is considered advisable to do this in order to maintain a high standard of cultivation.

In the Western Province *Antestia* continued to be a serious pest of Arabica coffee; in Ankole and in the lower altitudes of Kigezi the policy of distributing Robusta seedlings in the place of Arabica seedlings was expanded. In the latter District the number of seedlings distributed showed a substantial decrease as compared with 1938, and it is thought that discouragement following the damage to the crop by Antestia was largely responsible.

In Buganda a record crop of Robusta coffee (11,000 tons at end of year) was harvested and over 11,000 tons were passed for export. The low price paid to the grower offered little inducement to effect any improvement in field husbandry or crop management, while the falling off in quality due largely to the objectionable practice of stripping the trees and the mixing of unripe and ripe cherry occasioned by better prices soon after the commencement of the war gave rise to considerable concern.

The Robusta industry in Bwamba progressed steadily throughout the year, the sales showing an increase of 52 tons over last year.

In Busoga there was little response to attempts to popularize the growing of Robusta and the distribution of trees showed a marked decrease as compared with 1938.

The Coffee Grading Inspector examined 157,374 bags of coffee of which 2,851 bags were rejected. 13,420 tons were passed for export. The inspection fee was reduced on the 1st January to 23 cents per bag of 200 lbs., and to 15 cents for a 60 Kilo bag. Firms reduced their curing charge in September by Shs. 4 per ton weighed-in weight.

Tobacco.

Despite adverse weather conditions during the harvesting and ripening periods the yield of the Bunyoro tobacco crop was satisfactory though the quality of the crop as a whole was somewhat below that of the previous season. Seven licences were issued under the Native Produce Marketing Ordinance and the total purchases were 2,014,103 lbs. leaf. The average price obtained by the growers over the whole crop was 23·12 cents per pound.

In the West Nile increased production of air-cured tobacco was not encouraged owing to the reduced demand for this commodity. 77,122 lbs. leaf were produced from 452 acres, the crop being bought at 28 cents (Grade I) and 15 cents (Grade II) per pound.

In Toro and Ankole the industry is still in the experimental stage and the crop was purchased and conditioned by Government and sold to interested firms.

Apart from minor delays at the outbreak of war and the repeated failure of the hydraulic press pump, the Masindi Tobacco Packing Factory worked smoothly and dealt with 1,293,539 lbs. of leaf.

Oil Seeds.

In the Eastern Province about 61,000 acres were planted to groundnuts and although good yields were obtained the price was not sufficiently attractive to growers with the result that much of the crop was consumed locally. Marketing in Teso continued under the exclusive licence issued under the Native Produce Marketing Ordinance, some 556 tons (shelled) being purchased.

The popularity of simsim as an economic crop in the Western Province tended to decline, 680 tons being bought under licence as compared with 1,465 tons in 1938. In the Eastern Province, where good yields were general, 1,486 tons were sold, chiefly from Teso.

Non-Native Agriculture.

Rubber yields were low on most estates owing to dry weather. Prices, however, improved from 7d.–8d., to over 11d., per pound. The Toro Tea Company's Factory at Kijura was kept working at full capacity and it was found necessary to instal additional machinery. Yields on most tea estates were good and planting of additional acreages continued. Increased output of the two sugar estates was a feature of the year, 39,755 tons of white sugar being produced compared with 28,430 tons last year. Of this amount 11,884 tons were exported overseas.

Minor Economic Products.

Wheat continued to provide a useful cash crop for the Toro mountain people, 850 acres being planted; the average price per pound being 4·7 cents. Despite the rise in price of beeswax no expansion of the industry took place; 535 lbs. were purchased in the Western Province.

SECTION II.—WORK OF THE DEPARTMENT.

Cotton 1939–40.

Breeding Work.

At *Kawanda* further efforts were made to isolate strains from B.181 with better lint characters. Hybridisation work included F_2s and F_3s and back crosses of the B.181 × B.P.52 cross, one promising back cross being obtained. B.181 gave the highest yield, lowest blackarm and lowest wilt figures in the variety trial at Kawanda and also in the aggregate in the district variety trials.

The Kawanda Seed Farm was planted again with B.P.52; the results were highly satisfactory as a yield of 750 lbs. of seed cotton per acre was obtained from the 214 acres. This was largely due to improved spacing which was nearly 50% better than in the previous season. The crop was ginned at the Kawanda Ginnery and gave a ginning percentage of 31·6%.

Increase plots of X.3 (a mixture of B.P.52 and B.181) gave remarkable yields at Bukalasa; 1 acre of June sown yielding 1,976 lbs. of seed cotton.

At Serere work on blackarm resistance continues. The most promising strain is a derivative of B.P.50 (a Bukalasa selection) which gave the highest yield of seed cotton in the variety trial. This variety was also resistant to jassid attack. In the district variety trials in the Southern (Busoga) area N.17, N.17 M.2, S.P.84 and B.P.52 were all better than S.P.102. In the Northern area there was no difference between varieties while in the Eastern area N.17 M.2 was better than S.G.29 and S.P.102.

Diseases and Pests.

Work on resistance to Blackarm, Wilt, Lygus, Helopeltis and Jassid continues. The wilt position is complicated by the difficulty of ensuring that all plants have an equal chance of infection but the Senior Plant Pathologist has evolved a technique of dipping seedlings in a liquid culture of Verticillium which promises to solve the problem.

The Entomologist at Serere has continued his studies of Lygus and Jassid and some evidence is present that some varieties suffer less from Lygus attack than others.

The season generally was such as to reduce damage by disease and pests to a minimum. Pink Bollworm was the only bollworm to cause any damage at Serere; Lygus and Helopeltis caused damage in drier parts of Buganda particularly in Singo but elsewhere were not serious.

Cultural Trials.

Sowing date trials at Kawanda and Serere again showed the value of early planting. At Kawanda yields varied from 1,145 lbs. of seed cotton per acre for early June planting to 178 lbs. for mid-September while at Serere mid-May gave 515 lbs. per acre and mid-August 226 lbs. There is no doubt that propaganda to encourage early planting is well worth while.

Spacing trials again indicated the value of closer spacing and the very high yields obtained at Bukalasa at this spacing are sufficient to confirm, if any further confirmation be necessary, the increase in yield with 3′ × 1′ spacing.

Interplanting at Serere caused a reduction in the yield of cotton owing to the very dry weather.

Manurial Trials.

At Serere cotton seed meal gave higher yields than cotton seed. At Bukalasa cotton seed gave the usual increase in yield over control; it is of interest to note that control plots gave yields of 1,104 lbs. seed cotton per acre after 7 years of continuous cotton.

DISTRIBUTION OF NEW VARIETIES.

In Buganda the new variety B.P.52 was distributed to the Bugerere Segregated Area where good results were obtained. In the Eastern Province S.P.84 (U.4/4/2 derivative) was issued to the three Segregated Areas in Teso; it yielded at the rate of 214 lbs. seed cotton per acre over 29,782 acres with a ginning percentage of 33·2%. The variety S.P.20 (U.4/4/2) was grown in Usuku County of Teso. In addition a 6-acre Segregated plot of N.17 M.2 (a mass selected N.17) was grown near Jinja.

Coffee.

ARABICA.

Experimental.—Several experiments at Bugusege have reached the stage at which conclusions can be drawn and they are now being discontinued in favour of new experiments. The results of the following experiments are interesting:

(1) *1927 Planted Pruning Experiment.*

Total yields expressed as cwts. of wet cherry per acre for 11 seasons:—

Single Stem	282
Multiple Stem	439
Agobiada	567
Significant Difference	37

Agobiada is obviously the best and this treatment has suffered very slightly from die back when the other two treatments suffered severely. Trees of the multiple stem recover to some extent from die back but single stem trees die out and this method of pruning must be condemned for low elevations in Bugishu.

(2) *The 1932 Pruning and Spacing Experiment* shows yields in favour of close spacing (4′ × 4′) as compared with 6′ × 6′, 7′ × 7′ and 8′ × 8′.

COFFEE ARABICA PESTS.

Work on *Antestia* has continued although a temporary scarcity of the insect has hampered investigations. The season's work has confirmed that there is a very definite breeding season for the pest which synchronises with the period during which the coffee crop is maturing. This has an important bearing on the effect of parasites as with an insect which breeds seasonally a comparatively low percentage of parasitism suffices to control the insect.

It appears that in special circumstances Robusta may be a host plant for both species of Antestia and it is unsafe to recommend Robusta coffee in an area on the assumption that it will not be severely attacked by Antestia.

A severe outbreak of *Bixadus servicola* (coffee stem borer) occurred in parts of Bugishu necessitating an investigation into possible control measures. The recommendations made were successfully carried out by the growers themselves.

ROBUSTA.

Breeding work continues at Kawanda and investigation into bean size of selected Nganda progenies revealed that these beans are not unduly small and are well above the average for Uganda Robusta. The Robusta experiments at Bukalasa continue to give interesting results. After six

seasons mulch is superior to clean weeding which is superior to permanent cover crop which in turn is superior to weed cover. In the 1929 planted experiment "no shade" is still superior to *Gliricidia* which is superior to Banana shade; while clean weeding is superior to permanent cover. In this experiment the interaction of shade with ground cover is highly significant and cover crop depresses yield (as compared with clean weeding) with no shade and banana shade, while under Gliricidia shade the two ground treatments show no difference.

The complex experiment planted in 1935 confirms that "no shade" is superior to Gliricidia. A rather unexpected result is that to date clean weeding is better than full mulch but not better than alternate row mulch. A *debe* of cotton seed per tree is superior to control (no seed) but there is an interaction between shade and cotton seed—with no shade the difference between cotton seed and no seed is relatively small but under shade the effect of cotton seed is much greater.

Food Crops.

Work on Eleusine millet, Sorghums, Soy beans, etc., has continued. Promising strains of these have been isolated and are being worked up for distribution.

Oilseeds.

Groundnut breeding work at Serere although on a small scale is proving successful.

Education.

Nine Makerere trained students completed their practical training and were all recommended for entrance into the African Civil Service, as African Agricultural Assistants. Short courses for Baganda cultivators were held at Bukalasa, some seventy-six farmers attending; while a fortnight's course for chiefs was held at Serere. A start was made with the training of Agricultural Demonstrators at Bukalasa and Serere; most of the candidates for the courses being selected from the Agricultural Instructors already working in the Department. The educational qualifications of the majority of these did not come up to the required standard, but valuable experience was obtained in methods of training, etc.

As in the past, advice was given to Missionary bodies whenever possible; agricultural talks were prepared in connection with the experimental broadcasting carried out at Kampala.

Pasture Work.

Collections of grasses are being maintained at all stations and interesting studies of root development of various grasses and their effect on crumb structure of the soil are being made. The root system of *Paspalum* at Serere was outstanding. Grazing trials have been continued at Ngetta and the first results of one experiment are interesting as after three years resting under grass the first crop of cotton gave significantly higher yields for ungrazed plots as compared with grazed plots.

Regeneration of the Soil.

Experiments on the best grasses and also the minimum periods necessary for regeneration are being continued at Kawanda, Serere,

Ngetta and Bukalasa. As these are necessarily long term experiments no results are yet available.

Soil Conservation.

This all important work has progressed satisfactorily, especially in Teso District, where selected mitalla have been bunded. Strip cropping is being introduced wherever possible and there is every reason to believe that this will prove very effective in areas such as Teso where the slopes are not steep. The problem is not so easy of solution in Buganda, where so much land is in private ownership, but several Saza Chiefs are co-operating well and it is hoped that strip cropping will soon be introduced in some of the official mailos. At Bukalasa the possibilities of bunds planted with *Paspalum notatum* have been investigated and one or two of the more progressive farmers in the neighbourhood, with the assistance of the Bukalasa staff and students, are applying this method of soil conservation to their own holdings. Trials with contour hedges of elephant grass have also been initiated with the co-operation of neighbouring farmers, and there is growing evidence that this method, when employed with intelligence, may prove of considerable value not only on small farms but on the larger estates.

Locusts.

The influx of the migratory locust (*Locusta migratorioides*) compared with that of preceding seasons, was very much reduced. Extensive damage was done to millets in Lango, West Nile and Acholi, while general loss of grazing in Karamoja was experienced. However, the unusually dry latter half of the year adversely affected the locusts, while there is reason to believe that an epidemic of the fungus Empusa grylli was largely responsible for the rapid decline of the pest towards the end of the year. The red locust (*Nomadacris septemfasciata*) visited most of the districts west of the Nile and towards the latter half of the year was responsible for extensive damage to food crops in Toro; elsewhere the damage was less severe with the exception of Ankole where considerable damage was recorded on several occasions.

In the early part of 1940 Monsieur H. J. Bredo, Entomologist in Charge of the Locust Research Branch at Elizabethville, at the request of the Uganda Government, visited Busongora County in Toro to investigate the possibility that the low-lying land west of Lake George had become a permanent breeding ground of Nomadacris.

The result of his expedition, to which was attached an Entomologist of this Department, conclusively proved that these areas are not permanent breeding grounds for no locusts were found in the transitory stage from the solitary to gregarious phase.

SECTION III.—LEGISLATION.

The Cotton Export Duty Ordinance was amended to provide for the payment of duty at specified times.

The Tea Ordinance 1934 was amended in respect of the acreage that may be planted.

IMPERIAL ... INSTITUTE
29 OC 1942

UGANDA PROTECTORATE.

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE PERIOD

1st July, 1940, to 30th June, 1941.

PRICE: SH. 1/-

Published by Command of His Excellency the Governor.

ENTEBBE:
PRINTED BY THE GOVERNMENT PRINTER, UGANDA.
1942.

(3264)

DEPARTMENT OF AGRICULTURE.

ANNUAL REPORT

For the Period 1st July, 1940, to 30th June, 1941.

FOREWORD.

The release of nine European Officers for service with the Forces of the Crown and the leaving unfilled of several vacancies on the establishment pending approval of reorganisation proposals have put an increasing strain on the existing staff, but despite this inevitable effect of the war the activities of the Department have continued undiminished. A war time innovation which has proved to be successful as far as this Department is concerned is the appointment of several Agricultural Officers to act as Assistant District Commissioners in addition to their ordinary duties.

It has now been possible to define more closely programmes of rural reconstruction and the activities of the Provincial Teams ensure that all schemes are carried through with the full co-operation of all Departments concerned with development.

The work of the Department has been largely devoted to the all important matter of soil conservation. An increasing consciousness as to the urgency of this problem is being awakened amongst the cultivators and it is satisfactory to record the growing co-operation which is forthcoming from the Native Government and Administrations. It has now been decided to embark on a policy of strip cropping in all areas where slopes are reasonable and it is becoming obvious that this is a method of soil conservation which is very effective, is popular with cultivators as little labour is involved, and which can be put into practice with the minimum of supervision. It has become evident that the fundamental basis upon which any policy of soil conservation rests is the restoration and preservation of the crumb structure of the soil, as the destruction of structure is immediately followed by sheet erosion. The most satisfactory method of maintaining crumb structure so far evolved is a period of resting under a grass cover for three years after three years cultivation. Investigations as to suitable grasses for this purpose are proceeding—the main criterion of a good "crumb structure" grass being root development. A comprehensive programme of investigations into cattle and pasture management has been put into operation at Serere. Pasture trials are also being undertaken at Ngetta, Kawanda and Bukalasa. The use of cattle manure as a means of maintaining fertility is of considerable importance, particularly in areas in which overcrowding makes a three-year fallow impracticable.

The difficulty of getting the manure on to the land is being investigated and preliminary tests with movable "hurdle" kraals are proving satisfactory at Ajeluk.

Further propaganda to improve the standard of cultivation of the cotton crop has met with a very satisfactory response and spacing has improved beyond all expectations. The policy aims at increased production per acre rather than increased acreage.

The position regarding food production is satisfactory and the policy of self-sufficiency is continuing. No serious food shortages have occurred.

The Bugishu Coffee Scheme has been reorganised and the first year of working with the Bugishu Coffee Marketing Company as the Agents of the Scheme is proving satisfactory. Prices to the grower have been good and the crop has been disposed of by auction in Nairobi.

Three new economic crops are under trial and early results show distinct promise. It is fortunate that these crops are at their best in areas which are in need of economic crops. *Flax* is being tried out in Kigezi and Toro Districts and present indications are that in Kigezi satisfactory yields of good quality fibre are obtainable. *High nicotine-content Tobacco* is being grown in the Western Province and it is possible that this crop will become of commercial importance in the near future.

Flue Cured Tobacco as a native-grown crop is under trial in the West Nile District. Samples of leaf from trial plots have been favourably reported on and there is likely to be a good demand from local tobacco manufacturers for any leaf produced.

Animal Husbandry.—The ways of developing animal husbandry were investigated and a decision was reached as to the work to be conducted in the near future and of the appropriate division of functions between the Agricultural and Veterinary Departments to avoid unnecessary overlapping of work. Briefly, the projects are the breeding of a bigger type of working bullock at Serere and of woolled sheep at Kachwekano by the Agricultural Department, and the breeding of a dual-purpose type in Ankole by the Veterinary Department. The study of mixed farming, paddocking, grazing and housing of stock will be continued at certain centres, and poultry will also be kept for distribution to the people. Instruction to stock owners will be co-ordinated to avoid confusion.

Work in connexion with the Supply Board increased considerably and occupied the full time of the Statistician as well as a very considerable proportion of the Director's time.

The valuable co-operation which has been so readily forthcoming from the Provincial Administrations and from members of the general public in agricultural matters is much appreciated and greatly assists the work of the Department.

A tribute to all members of the Department is not out of place. In the face of many difficulties, in the absence of ordinary leave facilities and with the additional work thrown on them as a result of the war, they have carried on loyally and cheerfully in a manner which ensures harmonious relations outside as well as inside the Department.

G. W. NYE,
Acting Director of Agriculture.

SECTION I.—AGRICULTURE IN THE DEPENDENCY.

Cotton, 1940–41 Crop.

The planting season was somewhat disturbed by unusually dry conditions in several Districts, but despite this an area of 1,284,106 acres was planted. Good rains towards the end of 1940 followed by a severe dry season resulted in high yields and better grade than for several years. Owing to the unreasonably low prices offered at the time the buying season opened marketing was closed down for three weeks, after which satisfactory prices were paid. In order to slow down the rush of cotton to buying centres and on the railway it was decided to experiment with three-days-a-week buying in all Districts; the experience gained showed that this innovation was worthy of continuation and it will be repeated next season.

The total seed cotton marketed was 220,059 tons, equivalent to 369,699 bales assuming an average ginning outturn of 30%. Due to the activities of the Loading Sub-Committee very satisfactory arrangements for the railing of the crop to Mombasa and subsequent shipment were made.

Coffee.

The 1940/41 crop of Bugishu Arabica coffee crop was 2,165 tons (parchment coffee). This was about 2,000 tons below the previous season's crop, but slightly larger than that of the 1938/39 season. This seasonal fluctuation whereby good and poor crops alternate is a fairly regular feature of the Bugishu crop and the 1941/42 crop is expected to be a good one.

The total acreage under Arabica coffee in Bugishu is estimated to be 8,752 acres, which includes some 300,000 trees distributed during the first half of 1941. For the first time in the history of the Bugishu coffee industry, young trees in nurseries were sold instead of being distributed free of charge. This was done in order to restrain growers from planting more than they can maintain and also to ensure that only those who are genuinely in need of trees receive them. The trees were sold at 2 cents each (which represents about half the cost of production), the proceeds being credited to Native Administration funds. The scheme was a complete success.

Pruning was carried out satisfactorily and the standard of cultivation generally was good.

Under the Bugishu Coffee Scheme Ordinance (1940), the Bugishu Coffee Scheme became a body corporate and took over the functions and all assets and liabilities of the institution previously known as the Bugishu Coffee Scheme. It also appointed the Bugishu Coffee Marketing Company as its managing agent, for a period of 10 years, as from the 1st April, 1941.

In the Western Province, *Antestia*, which is a serious pest in that area, caused less damage than usual and this, combined with higher prices, stimulated more interest in the crop. Sales of native coffee, nearly all Arabica, amounted to 345 tons as compared with 315 tons during 1939/40 season.

In Buganda, in spite of another year of low prices, the standard of cultivation of Robusta coffee was maintained at a fairly high level and some 450,000 seedlings, mainly of the Nganda type, were distributed to growers.

The Robusta crop in the Bwamba area of the Western Province maintained its usual high standard of quality and marketing continued under the exclusive licence system. Increased cotton production has been responsible for a decrease in the annual plantings, but this may result in the existing trees receiving better attention. Prices were better than for some years past and the amount marketed was 206 tons as compared with a crop of 292 tons during the 1939/40 season.

During 1940, the Coffee Grading Inspector examined 175,232 bags of coffee of which 15,227 tons were passed for export.

Tobacco.

Production of fire cured leaf in Bunyoro amounted to 1,277,185 lbs., a decrease of some 700,000 lbs. compared with last year's crop, due to delay in planting out, owing to dry weather and subsequent lack of rain during the growing period. There was also an unusually large amount of damage by hail. The quality was good and the average price per lb. was 23·6 cents (based on 29 cents per lb. for Grade I and 19 cents per lb. for Grade II); the average return per acre to growers was Shs. 119/23.

The small air cured crop in the West Nile was produced under trying weather conditions and the average yield was no more than 159 lbs. per acre. The total production was 46,941 lbs. (77,122 lbs., 1939). Prices paid were 28 cents for Grade I of which there was 58% and 18 cents for Grade II, 42%.

Trials of *flue cured tobacco* have been made in West Nile District and an experimental barn has been erected at Arua. The first results indicate that flue cured tobacco will grow well in this District and reports of manufacturers on the samples of cured leaf have been very encouraging. In view of the local demand for this type of leaf trials are being extended and in 1942 50 acres will be grown on a commercial scale.

High nicotine-content tobacco is being grown by selected cultivators in Kigezi and Ankole. Yields are good, and although early difficulties with

distillation have resulted in comparatively low percentages of nicotine extract, there is little doubt that with improved technique better results will be forthcoming.

Oil Seeds.

In the Eastern Province, 862 tons of shelled groundnuts were marketed in 1940 (1939, 856 tons). The 1941 crop is expected to be exceptionally large as up to June, 1941, 83,400 acres had been planted and a record crop is expected.

The purchases of simsim in the Western Province during the period under review amounted to 703 tons. For the same period during the previous 12 months the purchases were 1,421 tons. The annual report for the previous year gave the figure as 680 tons, the apparent discrepancy being due to the changing of the period of the reports from the calendar year to the present arrangement. In the Eastern Province, weather conditions and gall midges made the 1940 sales of 385 tons compare very unfavourably with those of the record year of 1939, 1,486 tons.

The fluctuations in this crop are governed largely by weather conditions and the abundance or otherwise of food reserves.

Flax.

A series of variety, seed rate and sowing date trials of flax were established at various centres in Toro and Kigezi Districts. The results of these were distinctly promising and indicated that parts of Kigezi District are likely to be suitable for this crop. Samples of fibre were produced at a miniature mill constructed at Nyakasura School and reports by the Flax Grader in Kenya placed them in grades 3–5 valued at £152 to £145 per ton.

This crop will be given an extended trial in 1942 with limited cultivation by Africans in Kigezi District.

Foodcrop Production.

The policy of maintaining self-sufficiency in the matter of food supplies has continued and special attention is being given to improving the position in potential famine areas by increasing famine reserve crops.

The deterioration of plantain yields in areas round Kampala is becoming very marked and steps are being taken to persuade growers to check gully-erosion which is frequently severe in badly cultivated plantain gardens, to mulch between the rows, to use cotton seed and cattle dung as manures and to plant stop-wash lines of elephant grass and other grasses through the gardens. Progress is slow, but there is an increasing awaredness of the seriousness of the situation amongst cultivators and the Regents are taking a considerable interest in this important matter.

Non-Native Agriculture.

The two *sugar* mills worked to capacity and the total production for 1940 was 45,272 tons of which 20,850 tons were exported. The Senior Plant Pathologist has continued to supervise the propagation of varieties of cane at Kawanda for distribution to East African Sugar Estates.

Tea production is steadily increasing as the acreage allowed under the Restriction Scheme is coming into plucking. Yields have been good and in general the quality of Uganda tea is satisfactory. A demonstration plot of six Jats has been established at Kawanda. In Toro, manurial experiments have been started on three tea estates to compare the effects of sulphate of ammonia, cotton seed and cotton seed ash.

The Senior Chemist conducted soil surveys in some tea areas in Toro and at Mityana. He finds it clear that the simple pH value of soils in this country is not the determining factor as some of the best tea gardens at Mityana have a pH value of 6·5.

Minor Economic Products.

Attempts to increase the production of *beeswax* by organisation of marketing and opening up of a new District met with encouraging results, 2,196 lbs. being marketed compared with 535 lbs. in the previous year.

Wheat remained at the same level in the Toro District. The production of *English Vegetables* was organised in Bugishu primarily for the supply of military requirements.

SECTION II.—WORK OF THE DEPARTMENT.

Cotton.

Breeding Work and Seed Increase.—Work at Kawanda and Serere dealt largely with resistance to diseases and insect pests, improvement in ginning percentage and in quality. The Bukalasa selection B.181 appears to be the variety most resistant to Blackarm as well as to Wilt at both centres and in addition it is a high yielder. Investigational work on seed type is producing evidence that black seeded types, which are very common in both Nyasaland Upland and Buganda Local, are undesirable as they have a low ginning percentage, and that an entirely white fuzzy seed should be one of the objectives. B.P.52 did not yield so well in Buganda as in previous years; this was to some extent due to a late and prolonged growing season which favoured late-maturing varieties such as Local and B.181. Long range work on hybridisation and mixtures is continuing.

The increase of B.P.52 in Buganda was carried to the next stage of approximately 24,000 acres. S.P.84 was issued from the Teso Segregated Areas to replace S.P.20 in Usuku, this latter cotton having been found insufficiently acceptable to the trade. North and South Teso Zones were re-supplied with N.17 seed from Busoga to replace S.G.29. The increase scheme near Jinja was carried to the next stage by the issue of N.17 M.2 (a mass selected N.17) to registered growers.

Diseases and Pests.—The weather during the cotton season was such as to reduce the damage by pests and diseases to a low figure, although Lygus caused loss in certain areas. Pink Bollworm was found in Bwamba and Usuku so that it is now distributed throughout the cotton growing areas of the Protectorate. In a uniformity trial at Serere very close correlation was found between Lygus damage and plant height. Various manurial trials at Serere have now shown that cotton in plots manured with cotton seed, cotton seed meal, cotton seed ash or farmyard manure suffers greater damage from Lygus than cotton on unmanured plots although cotton on the manured plots yielded more than on the unmanured ones.

Neither Blackarm nor Wilt was widespread. The Senior Plant Pathologist has been working on the inoculation of Wilt in all cotton plants in the Kawanda Breeding Plot to ensure uniform infection and to assist selection for resistance. The question of tolerance to Wilt is under investigation.

Cultivation.

A considerable drive to encourage earlier planting and closer spacing of the cotton crop met with satisfactory results as is shown in the table below:—

The optimum spacing is 3 ft. × 1 ft.

	1940 *Area per Plant Square Feet.*	*1939* *Area per Plant Square Feet.*
EASTERN PROVINCE:		
Busoga District	5·09	8·56
Central District	4·01	5·66
Teso District	5·53	6·00
WESTERN PROVINCE:		
Lango District	5·55	7·31
Bunyoro District	5·88	7·2
West Nile District	5·43	—
BUGANDA PROVINCE:		
Mengo District	7·39	12·2
Masaka District	6·73	11·7
Mubende District	4·88	9·9

The effect of interplanting cotton with beans, groundnuts, etc., is still being investigated. It appears that interplanting tends to reduce yields of cotton, but the time the interplant crop is planted is probably the important factor.

Manurial Trials.

At Kawanda and Serere, comparisons of cotton seed and cotton seed ash were made while at Serere and Bukalasa, trials with cotton seed and cotton seed meal were repeated, but results were not significant.

The green manure and cotton seed experiment at Bukalasa which has been running for a number of years again showed that green manure gives no increase in yield while there is a definite response to a dressing of four tons of cotton seed to the acre.

Coffee.

Arabica.

Experimental.—At Bugusege, the trees in the 1932 Cultural Experiment appear to have reached the point of exhaustion, except in the shade and mulched treatments. Time of pruning trials were continued and observations were commenced on inter-row wash breaks with various plants and slashing treatments. Variety trials at numerous centres in Bugishu indicate the superiority of Kents Arabica, though confirmation is required as to its liquoring quality.

At Kawanda, observation rows of various types show interesting differences; although Kents variety is outstanding compared with the present types under cultivation, there are indications that by devoting attention to indigenous strains of wild coffee great advances will be made.

In Kigezi, experiments to ascertain the effect on *Antestia* incidence of certain ground treatments have now been in progress for four years. Results are not yet conclusive.

Pests.—Work on biological control of *Antestia* continued. The introduction of the parasites *Epineura rubens* Vill. and *Corioxenos Antestiae* Blair. on an experimental scale has given very encouraging results in some localities, but more widespread introduction has been prevented by the continued general scarcity of the pest. Further knowledge has been gained of the distribution of *Antestia* spp. and of their wild host plants.

The campaign in Bugishu against *Bixadus sierricola* White was successfully continued and the pest brought under control. The maintenance of control, which depends on the cultivators, may be difficult now that the pest is much less in evidence. Wild host plants of this stem-borer were investigated and three species (all Rubiaceae) are now known.

Robusta.

The breeding work at Kawanda shows that not only the genetic constitution but also the method of training is responsible for vigour; where the trees are trained to spread when young they bear smaller early crops and later grow into more productive trees than those allowed to grow upright.

At Bukalasa, the results of the 1929 planted shade and cover crop experiment strengthen the deductions drawn in last year's report. In the 1935 planted experiment results support the remarks previously made, and lend weight to the argument that the less ground cover there is, the higher the yield. The dressing of one 4-gallon tin of cotton seed per tree per year continues to give a moderate increase in yield.

Food Crops.

Work is continuing at Serere and Kawanda on the selection of improved strains of local food crops—Eleusine millet, Sorghums, Groundnuts, Soybeans, Cassava, Sweet Potatoes, etc. One success reported is a groundnut B.239 (origin Spanish 68/6) which is an excellent yielder and very palatable. Issues of seed of this variety are being made to selected cultivators. Tepary beans have proved very successful at Serere where large stocks were raised for general distribution in the drier areas.

Soybean trials at all experimental centres are being continued and stocks of seed of the most promising varieties such as R.184 and S.42 are being built up for distribution. Attempts to popularise this valuable food crop are being made by means of demonstration plots at schools.

Pasture Work.

The importance of pastures is fully recognised and work is proceeding at Ngetta, Serere and Kawanda on the palatability of various grasses to stock and also of their effect on condition. Root systems are being studied and the Senior Chemist is investigating the effect on crumb structure of various grasses likely to be used for temporary pastures. Methods of estimating crumb structure are being investigated, as its relation to soil erosion is so close that a classification of soils according to their crumb structure will give a clear picture of the erodibility of various soil types. Numerous grasses—local and imported—are under trial at Kawanda and Serere.

Animal Husbandry.

A considerable amount of the work at Serere is now given up to animal husbandry. Investigations into stock management and manure production are proceeding successfully, with the main objects in view of maintaining and increasing soil fertility and the production of beef. Most of the experiments are being conducted on resting land which will again come into cultivation. Methods of control such as tethering, establishment of suitable hedges, etc., are being studied. It is too early to expect results from these experiments, but two 10-acre blocks at Serere have maintained a beast per acre from September, 1940, until March, 1941, throughout an exceptional dry season and the cattle were in better condition at the end of the period than at the beginning.

Further investigations are in progress at Ngetta and stall feeding of store cattle is to be tried at Bukalasa and Kawanda for manure production in overcrowded areas where there is insufficient land available for a three-year grass fallow.

Soil Conservation.

The encouragement of strip cropping is proceeding in all districts, and has met with considerable success in Teso District where 90% of the cotton is now planted with strips of grass left at intervals down the slopes. In Buganda, the use of narrow lines of elephant grass is being encouraged and progress, though slow, is being made. There is no doubt that a slow and gradual awakening to the dangers of soil erosion and over-cultivation is occurring amongst the African cultivators.

There are areas around Kampala in particular where the high concentration of population has resulted in a state of affairs where insufficient land is available to permit of the prescribed period of three years rest and it is obvious that the only way by which fertility can be preserved is to persuade the cultivators to use such manures as are available, *e.g.*, kraal manure and cotton seed.

Fertility Experiments.

Experiments at Serere with small dressings of farmyard manure ($2\frac{1}{2}$ and 5 tons per acre) are showing increased cotton yields and an increase in yields of following crops.

Other long term fertility experiments are still in progress at Serere and Bukalasa and no results are yet available. The Senior Chemist is investigating soil structure in these experiments and although it has not yet been possible to devise a rapid and at the same time sound technique for the evaluation of soil structure, there are indications that a two-year resting period may be as effective as three years on some soil types.

Rural Reconstruction.

Through the generosity of an anonymous donor funds have been made available to assist in the work of reconstructing a mutalla in Teso District. This mutalla—Ajeluk—has been selected as being typical of as large an area as possible. The whole mutalla of some 3,000 acres is being reorganised—houses are being resited in relation to the availability of land, all cropping is being done in strips, water holes are being impounded, grazing areas have been demarcated, land unsuited to annual cultivation is being planted with trees for fuel and building poles and in addition a school, dispensary and meeting hall are being erected. In Buganda three major schemes have been started at Nsangi and Lwada in Mengo and at Kiyimbwe in Masaka. Despite difficulties regarding land tenure considerable progress has been made at these centres; the local population is on the whole co-operating well and an increasing number of cultivators from outside these areas are applying to have their farms marked out for strip cropping.

A Conference was held at Serere in May to discuss all phases of rural reconstruction. It was attended by officers of the Provincial Administration and of the Agricultural, Forestry, Medical and Veterinary Departments. The report of the proceedings of the Conference has been printed.

Education.

Three Makerere students completed their practical training at Serere and all passed their final examinations at the end of 1940. During the first half of 1941, both 4th and 5th year students underwent practical training, a total of 18 being in residence. A practical course for men likely to be suitable as assistants in Rural Reconstruction was continued at Serere, and nine were regarded as satisfactory and will be seconded to other technical departments for further training. The short courses for African farmers at Bukalasa continued to be popular, and additional courses were held for minor chiefs. A regular series of short articles on agriculture was commenced in the Vernacular Press.

Locusts.

The infestations by both *Locusta* and *Nomadacris* continued on a rapidly declining scale until February after which month no further reports of the swarming phase were received. No extensive damage to crops was caused by locusts.

SECTION III.—LEGISLATION.

The Coffee Grading Ordinance was amended to provide for the export of hulled coffee only, and the rules under this Ordinance were amended to provide for the export of graded coffee only.

An Ordinance to establish and regulate the Bugishu Coffee Scheme was enacted.

The Cotton Export Duty Ordinance was amended to provide for a variation of the sliding scheme of duty payable.

An Ordinance to provide for the control of the export and production of tea was enacted.

IMPERIAL MYCOLOGICAL INSTITUTE
2 OCT 1943

UGANDA PROTECTORATE.

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE.

FOR THE PERIOD

1st July, 1941, to 30th June, 1942.

PRICE: SH. 1/-.

Published by Command of His Excellency the Governor.

ENTEBBE:
PRINTED BY THE GOVERNMENT PRINTER, UGANDA.
1943.

5092—420—6-43.

DEPARTMENT OF AGRICULTURE.

ANNUAL REPORT.

For the Period 1st July, 1941, to 30th June, 1942.

FOREWORD.

The long awaited demand for foodstuffs for export materialised early in 1942 with a request for maximum production of oilseeds for the Ministry of Food. Later in the year, a full production programme for East Africa was drawn up by the newly formed East African Production Committee.

One of the most important actions taken by the Committee was to recommend fixed prices to the producer for all commodities required for export. This policy of guaranteeing prices before the crop is planted appeals to the African cultivator and is the surest method of obtaining maximum production.

The field staff of the Department became very actively engaged in implementing the new production programmes and it is a tribute to the energy and zeal of those concerned that despite this increase in their duties it was possible to make considerable headway with soil conservation measures. The active and willing co-operation of the Provincial Administrations assisted immeasurably in carrying through the new planting programmes.

In addition to targets of 10,000 tons of groundnuts and 5,000 tons of sesame, Uganda was called upon to produce maximum quantities of rice and soy beans, and to increase production of wheat and European vegetables.

During the period covered by this report the East African maize position was still satisfactory. In April, 1942, however it was decided that the Protectorate should aim at producing sufficient maize for its own consumption in order to relieve the congestion on the railway. The large scale production of maize in Uganda began early in 1943 and will be discussed in the next Annual Report.

Rubber production became of paramount importance after the fall of Malaya and active steps were taken to obtain maximum production.

There was a considerable demand for plantation crops—coffee, tea and sugar.

The spread of strip cropping has continued satisfactorily in most districts and there is now no doubt that this method is successful in preventing soil erosion in annual crops in all areas of the Protectorate. It is easy for the African to put into practice and costs nothing. The introduction of new crops such as, flax, wheat and rye has enabled this Department to ensure that all plots under these crops are strip planted.

Further work by the Chemical Section on the crumb structure of the soil has confirmed its paramount importance in preserving fertility and in checking erosion—strip cropping retains the soil on the plot but a satisfactory crumb structure prevents soil creep; a combination of the two is the solution to our soil problems and the maintenance of crumb structure must be the next stage after strip cropping has been established.

The cultivation of high nicotine content tobacco, flax and flue-cured tobacco as new industries, has continued and expanded. Flax, in particular, is proving to be a very suitable crop for peasant cultivation in Kigezi District and early reports on the quality of fibre produced are most encouraging.

Animal husbandry investigations are being extended and it has been possible to make a good start with stall feeding and other trials at Kawanda. The necessity for maintaining fertility in the semi urban area around Kampala is becoming a major problem, as with a high population density there is insufficient land to make a resting period possible. It is hoped that a system of stall feeding cattle for meat and manure production will prove to be a practical solution to the difficulty as the only remedy appears to be a combination of strip cropping and manuring.

All officers of the Department have shown themselves to be capable of working under high pressure with no sign of strain or weariness. The considerable increase in the activities of the Department has meant that the African members have had to take a much greater share of the field work than they have done previously and I record with considerable pleasure that they have almost without exception shown themselves to be fully capable of accepting their increased responsibilities.

G. W. NYE,
Acting Director of Agriculture.

SECTION I.—AGRICULTURE IN THE DEPENDENCY.

Cotton.

1941–42 Crop.—Weather conditions at the time of planting were favourable in most Districts and 1,287,256 acres were planted as compared to 1,284,206 acres in 1941. Good weather conditions continued up to the end of November, but heavy rains in December, which carried on throughout the months which normally constitute the dry season, reduced the crop considerably. The grade also, especially in Buganda, was adversely affected although in Bugerere and Kyagwe where BP.52 was planted, it was decidedly better than elsewhere. As a result of extensive propaganda during the time when buying was suspended, the grade improved and the posting of a sub-chief at each buying centre helped considerably in this respect.

Buying was again confined to three days a week, an innovation which has proved to be very satisfactory.

The total seed cotton marketed amounted to 140,697 tons, equivalent to approximately 236,370 bales as compared to 369,699 bales in the 1940/41 season.

The unsatisfactory prices offered for Uganda cotton necessitated the suspension of buying from the 13th February to the 12th March. The agreement by the Ministry of Supply to take nearly half the crop had the effect of stimulating demand and hardening prices on the resumption of buying. The average price paid for seed cotton during the season was Shs. 7/68 per 100 lbs. and the gross return to growers was £1,302,994 as against £2,157,194 for the previous crop.

The arrangements for railing and coast storage made by the Uganda Loading Committee continued to be very satisfactory and there was no undue delay in railing the crop to Mombasa or in subsequent shipment.

1942–43 Crop.—At the end of June, only 103,961 acres had been planted compared to 371,989 acres during the same period of the previous season. This was primarily due to the fact that weather conditions were dry and unsuitable for planting but the growers were dissatisfied with the prices they obtained last year and showed more enthusiasm for other crops such as groundnuts and simsim for which there was a greatly increased demand as a result of the war.

Coffee.

Bugishu.—The 1941/42 Bugishu Arabica coffee crop amounted to 2,926 tons (parchment coffee) as against 2,165 tons in the previous season. The average prices paid to growers were Sh. 1/32 and Shs. 4/06 per 4 gallon tin for cherry and parchment respectively. The corresponding prices in the previous season were Cents 92 and Shs. 2/72.

The total acreage under Arabica coffee in Bugishu is now estimated to be 9,000 acres, which includes 301,769 seedlings distributed in the period under report.

Cultivation was satisfactorily carried out and the effect of a modified-multiple-stem system of pruning in levelling up biennial fluctuations in yield is now becoming apparent.

Insect pests reduced the quantity of the crop somewhat and also its quality. *Stephanoderes* caused many "lights" and *Antestia* was responsible for considerable damage, particularly in North Bugishu. *Bixadus* was brought under control by

February, 1942, as a result of intensive action taken by the growers in rubbing the trees to prevent egg laying and in destroying the wild host plants.

Western Province.—In Toro District, a more promising outlook for the control of *Antestia* has led to increased planting of Arabica coffee.

Bwamba Robusta coffee still commands a premium over Kampala Robusta. A total of 316 tons was sold as compared to 206 tons in 1940.

In Ankole and Kigezi, 441 tons of coffee, mostly Arabica, were marketed as against 287 tons in 1940.

Buganda.—With the exception of Masaka, where the coffee suffered from extremely dry weather before the onset of the autumn rains, the established plots were maintained in fair condition and with rising prices a noticeable improvement in cultivation took place. New plantings were successfully established and a total of 784,768 young plants were issued as against 446,057 in 1940. In December, 1941, the prices for hulled Robusta and Arabica were 19 and 27 cents respectively and by June, 1942, the prices had increased to 31 and 33 cents.

During 1941, the Coffee Grading Inspectors examined 18,134 tons of coffee of which 17,747 tons were passed for export.

Tobacco.

In Bunyoro, purchases of fire-cured leaf amounted to 1,706,254 lbs., an increase of 429,069 lbs. over the previous season. The yield per acre was slightly lower owing to adverse weather conditions which included severe hail damage in some areas. Quality was good and the price paid was the same as last year. The average return per acre to growers was Shs. 102/94. A total of 951,496 lbs. of unmanufactured tobacco was exported during 1941.

In the West Nile, the air-cured crop amounted to 70,552 lbs. as against 46,941 lbs. in 1940. The gross return to the grower per acre was Shs. 48/57 as against Shs 37/80 in 1941.

Trials of flue-cured tobacco conducted in 1940 indicated that this crop will grow satisfactorily in the West Nile District and it was decided to begin cultivation by Africans on a small scale, two crops of 50 acres each being grown in 1942. Very satisfactory progress is being made in spite of numerous war time practical difficulties in connexion with the erection of the barns.

As a result of increased demands for nicotine, 126 acres of high nicotine content tobacco were grown, mostly in Kigezi; yields varied from 360 to 700 lbs. of dry leaf per acre. In the early part of 1942, 300 acres were planted and are expected to yield 70,000 lbs. of leaf. High nicotine content depends largely on good cultural methods and there is still room for improvement in this respect.

Oilseeds.

Groundnuts.—In the Eastern Province, a total of 83,439 acres of groundnuts were planted in the spring of 1941, and from this acreage 2,178 tons were purchased for export at an average price of 11½ cents per lb. (shelled) to the grower. Uganda undertook to produce 10,000 tons of groundnuts for export in 1942; extensive propaganda was undertaken in the spring of 1942 which resulted in 152,292 acres being planted in the Eastern Province alone. At the end of June, crop prospects were good.

In Buganda, a surplus of 700 tons was exported making the total exports from Uganda in respect of 1941 2,888 tons. A considerably increased acreage was planted in the spring of 1942.

Simsim (*Sesame*).—This crop is mainly cultivated in the Western Province and the amount marketed is governed primarily by the local food position. Prices were higher in 1941 than in 1940, and varied from 6 cents per lb. in the West Nile District to between 8 and 9 cents in Bunyoro. The total purchases in 1941 were 960 tons compared to 1,386 tons in 1940. Up to the end of June, 1942, 1,530 tons were purchased in Lango and Acholi Districts.

In the Eastern Province, in spite of unfavourable weather conditions 1,013 tons were marketed compared to 385 tons in 1940.

Flax.

As a result of the 1940 trials it was decided to concentrate the production of flax in Kigezi District.

Some 70 acres of Liral Crown variety were planted in the spring rains of 1942 and arrangements made to plant up a further 200 acres in the autumn. Sowing, cultivation and harvesting were well carried out and it was proved that this crop is very suitable for native cultivation under close supervision. A 20 berth factory similar to those in operation in Kenya is in the course of erection.

There is little doubt that a native flax industry can be maintained in Uganda on a sound financial basis at normal peace time prices as low as £50 per ton for fibre in Great Britain.

In preliminary trials of small plots spread over ten gombololas in Kigezi District, the variety Liral Crown gave an average yield per acre of 1,723 lbs. of straw and 262 lbs. of seed. At a price of 3½ cents per lb. of straw, and 6 cents per lb. of seed the cash return per acre to the grower is approximately Shs. 76.

Chillies.

In 1941, Uganda exported 6,532 cwts., valued at £18,964. To June, 1942, exports amounted to 7,115 cwts., valued at £23,430.

Foodcrop Production.

The policy of maintaining self sufficiency in food supplies, combined with special war production requirements, was accepted. With the exception of Masaka District, where 1,000 tons of maize flour had to be imported following the failure of the spring crops, the position as regards the production of foodstuffs was very satisfactory. Efforts were continued to popularise soy beans and good yields of this crop were obtained. Tepary beans did well in the drier areas. In the Eastern Province, good crops of the "finger millet" (Eleusine) were obtained in the first half of 1942.

The deterioration of plantain yields in areas round Kampala continued to receive the attention of the Department and some progress was made by mulching and by planting stop-wash lines of elephant grass and other grasses through the gardens. The work being done on the demonstration mitalla at Nsangi and elsewhere will, it is hoped, act as a stimulus and guide to cultivators in Buganda.

Non-Native Agriculture.

Rubber.—The loss of Malaya in February, 1942, led to an immediate overhaul of the rubber industry and a Committee was set up under the Chairmanship of an officer of the Department to ensure the maximum production of rubber and to arrange for financial assistance to planters where necessary. Messrs. Jardine, Matheson & Company were appointed Secretaries to the Rubber Production Committee and were responsible for marketing arrangements.

Owing to the low prices which had prevailed for rubber during the last ten years, many of the estates were in a neglected condition and loans were made available to owners of those estates which needed considerable expenditure to bring them back into a better state of cultivation and production. Grants made are recovered when the rubber is marketed. The Defence (Control of Rubber) Regulations ensure that all rubber trees are tapped and that all the rubber produced is sold to the Ministry of Supply. In order to ensure maximum production it was necessary to resort to "root tapping" on some estates.

The wild rubber resources of the Protectorate were reviewed and arrangements were made for the exploitation of Funtumia Elastica in the Mabira and Budongo Forests. The Landolphia vine exists in certain parts of the Protectorate, notably Masaka District including the Sesse Islands, and preliminary surveys of these areas were made.

In 1941, Uganda exported 482 tons of rubber valued at £43,723. For the six months ended the 30th June, 1942, exports were 223 tons valued at £21,900. Estimated production for the 1942/43 year is 650 tons and in 1943/44 production is estimated at 900 to 1,000 tons.

Sugar.—Both mills in Uganda worked to capacity and the total production in 1941 was 48,800 tons of sugar of which 11,720 tons were exported. The corresponding figures for 1940 were 45,272 tons and 20,850 tons respectively. The decrease in the amount exported was due primarily to the increased demand for the Armed Forces in East Africa.

The propagation and issue of new varieties of cane continued at Kawanda under the supervision of the Senior Plant Pathologist. The varieties grown in the nursery at Kawanda during 1940 and 1941 were examined in detail and the best of these were distributed to the sugar estates in April. The remainder were discarded to make room for the first propagation of a large number of selected seedlings grown at Kawanda in the previous year from seed imported from Coimbatore. It seems unlikely that any of the new varieties will show an improvement on the standard varieties on Uganda Sugar Estates, namely P.O.J.2725 and P.O.J.2878.

Tea.—The total acreage of tea licensed under the Restriction Scheme as at the 31st March, 1942, was 4,680 of which the greater part had been planted up. Production in 1942 is expected to be about 820 tons. In 1941, Uganda exported 399 tons valued at £55,359 as against 215 tons in 1940 valued at £24,351.

The Senior Chemist continued investigations on tea soils. Subsequent examination confirmed the fact that acidity alone is not the limiting factor and results suggest that tea is allergic to the calcium ion in any form of combination.

On the tea manurial experiment at Kijura in Toro District, cotton seed at the rate of 3 tons per acre produced the highest return of green leaf, followed closely by sulphate of ammonia at 3 cwt. per acre.

Sisal.—The acreage under this crop is now 9,550. As a result of a large fire which destroyed the factory only 868 tons of fibre valued at £17,251 were exported in 1941 as against 2,423 tons valued at £49,433 in 1940. Exports for the first six months of 1942 were 1,240 tons valued at £24,224.

SECTION II.—WORK OF THE DEPARTMENT.

Cotton.

GENETICS AND BREEDING.

Work at Kawanda was largely concerned with the task of producing new strains of cotton which would be better than the present variety BP.52. The principal material was laid down in replicated progeny rows but the technique was not satisfactory. In addition a good deal of new material from overseas was introduced and planted in single rows. Furthermore, a large number of varieties were hybridised in order to introduce new genes into our present material. The fuzzy seed character was insisted upon in all strains. All the material was given the maximum opportunity of contracting Blackarm and Verticillium Wilt.

At Serere the process of reducing a wide range of material to a number of well defined types was concluded. These types went forward for a final sorting of the fuzzy seed character and for a new programme for obtaining resistance to Blackarm. A very large number of varieties were planted in trials with the idea of taking stock before introducing a new programme. Growth was good and uniform and some very interesting eye-comparisons were possible in the field before Lygus had had time to spoil the appearance of the plants (as it eventually does every year).

At Kawanda the variety B.181 and its derivatives were the highest yielders. At Serere the BP.50 family was pre-eminent for yield with B.181 second. Amongst the Nyasaland Upland cottons the order was—BP.52, N.17 and SG.29. At both places the relation between black seeds and low ginning percentage was demonstrated conclusively by sorting these types from the same bulk seed and testing them in replicated trials. In the spinning tests BP.52 had no equal at either place. At Serere the varieties BP.50 and B.181 had good spinning records but this was not so on the Kawanda side.

SEED INCREASE.

BP.52 was supplied to Kyagwe, Kyadondo and Bulemezi counties—a total of nearly a quarter of a million acres in all. The increase of N17M2 was continued in the neighbourhood of Jinja but as yields were very low, multiplication made very little progress. At Serere the main Farm was planted with a bulk of N17 seed from which all black and green seeds had been removed by hand; in this way a start was made with supplying a purified stock of the old N17 variety pending the production of other new strains at Serere.

CULTIVATION.

Trials at Serere showed conclusively that seed stored in native huts loses its viability more rapidly than seed stored in bulk at the ginneries. This result applied only to the drier areas of the Eastern and Western Provinces and different results might be obtained in Buganda, but the point is of some importance. Efforts to obtain earlier planting and closer spacing made substantial progress in all districts except Busoga and West Nile—in the latter district the conditions during the planting season were exceedingly difficult. A special investigation of Lygus in Acholi and West Nile was conducted in August and September by the Entomologist. Briefly, the tentative conclusion reached was that in parts of these districts damage to cotton was negligible or absent owing to the presence of Sorghum in a stage attractive to the bug throughout the period when cotton is susceptible to attack.

At Serere interplanting cotton with Tepary beans brought about some loss of cotton but gave a big return of beans. At Kawanda preliminary observations indicate that groundnuts and native beans can be interplanted successfully; Soy beans do not thrive in cotton and Tepary beans grow well but spoil the cotton. At Ngetta Soy beans were again unsuitable for interplanting but Tepary beans behaved in the same manner as at Serere. It was found at Ngetta that planting cotton seed in continuous lines after treatment with mud to prevent the fuzz adhering, used less seed and took less time.

Coffee.

ARABICA.

Experimental.—At Bugusege there was a fair crop on the 1932 cultural experiment and in appearance the plots under shade were outstanding. In the 1932 pruning and spacing experiment the modified multiple stem trees gave a record yield but the unlimited terminal growth trees suffered severely from die-back. In a new experiment designed to find the best time for pruning, April and May cutting gave the best result but it is recognised that this may have been a purely seasonal effect. In the variety trial at Bududa Kent's Arabica continued to make robust growth. At Kawanda Kent's Arabica is again the most satisfactory type and a small trial was started to observe the effect of shading with bark cloth and bananas, as against no shade. In West Nile District the yield records were inconclusive but judging by the appearance of the trees, shade is desirable. New variety trials were planted in Ankole and Kigezi Districts.

ROBUSTA.

The 1934 shade and ground treatment experiment has shown a depressing effect in those plots having a full elephant grass mulch, and it also supports the 1929 experiment in showing that no shade is better than shade, although the appearance of the shaded coffee is much better than the unshaded. Manuring with cotton seed gave a considerable return, particularly under shade. Gliricidia has proved unsatisfactory as a shade tree on account of its bad habit of growth and susceptibility to Mealy-bug and root diseases and it is being replaced by Ficus (bark-cloth). At Kawanda there was some die-back on the Robusta progeny but the "Nganda" types were little affected and yielded well. The costings trial made good progress and it was noteworthy that there were no failures under banana shade whereas bushes in the open show the effects of the strong dry wind which prevails at Kawanda.

Observations on the Antestia parasite experiments in Singo and Toro have continued. Parasitism by *Epineura* continued to increase in Singo and reached 55%. Subsequently, complete and repeated cultivation of the ground interfered with the experiment by causing the death, directly and indirectly, of the pupae of the parasite. It is of importance to note however that *Epineura* survived the treatment and started once more to increase. The parasite *Corioxenos* increased rapidly at first in Toro but slowed down to about 30%. The Antestia population was greatly reduced in consequence of the cumulative effect of attack by *Corioxenos* but it was not reduced sufficiently to prevent appreciable damage. *Bixadus* has been very successfully checked and controlled in Bugishu.

Food Crops.

The new groundnut variety B.239 from Serere was not altogether popular and it seems likely that it will be superseded by the variety "Atuboi" from Ngetta which is more attractive in appearance and now appears to yield equally well. For two years Serere has been planting groundnuts appreciably earlier than average local practice and this year sowing date trials showed that yields from March plantings were very much greater than yields from April and May plantings.

Soy beans were fickle in behaviour and they did not appear to benefit from early planting but lines one foot apart were better at Serere than lines two feet apart and at both places plants 12 ins. apart in the line were definitely too wide. At the end of the season all work on Soy beans was concentrated at Kawanda.

Tepary beans continued to be very successful at Serere and considerable quantities of seed were distributed to the people.

Experimental work was begun at Serere on the Cassava mosaic problem. New resistant material was imported from Amani and a start was made in the study of mosaic in relation to sowing date.

Cinchona.

Following on a favourable report in 1941 from Messrs. Howards of an analysis of bark from 50 trees grown at Kitubulu (near Entebbe), samples of bark from 37 of the largest trees were prepared and sent to Messrs. Howards, England. The report on these samples showed that they were of good quality, four of them containing more than 10% of quinine sulphate.

Seed from both selected and unselected trees was planted in nursery beds early in 1942 to provide seedlings for distribution in 1943.

Animal Husbandry.

Animal husbandry investigations are being considerably extended at Serere, Kawanda and Ngetta but it is too early to give results of experiments in progress; the following facts have however emerged at Serere:—

(1) One acre of natural grass provides just sufficient food for two bullocks.

(2) One acre of natural grass provides sufficient bedding for two bullocks.

(3) Stall fed bullocks do not keep in such good condition as those grazed outside.

(4) Stock grazed on permanent pasture become heavily infested with ticks. Therefore occasional burning of the grass or dipping of the cattle is essential.

(5) One bullock per acre, grazing day and night, is the optimum stocking rate under Serere conditions.

(6) Thin iron-stone soils can provide very useful grazing if used with care.

(7) The method of grazing by tethering is simple and readily understood by Africans, but the number of cattle to a herdsman is less than in the normal native practice of herding.

(8) If burning is started early enough it is possible to obtain palatable feed throughout a normal dry season without recourse to fierce fires. Burning should be carried out in the early morning or after rain.

In the first eight months of 1941, Messrs. Liebigs bought 11,200 cattle from Karamoja for their factory in Kenya. In Lango 8,000 cattle were sold at organised markets as against 6,000 in 1940, and some 25,000 were sold out of the district.

Rural Reconstruction.

(*a*) *Soil Conservation.*—A full report on soil conservation in 1941 has already been published.

Considerable progress has been made in strip cropping especially in the Eastern Province. In Buganda many badly gullied areas were dealt with as the result of efforts by the Chiefs, and Agricultural Instructors. In Buganda work was largely devoted to establishing the six strip alternating grass fallow system on prison farms and school lands as demonstrations. At the same time the planting of elephant grass lines was encouraged in the over populated areas where insufficient resting land is available. In Masaka, many hundreds of coffee plots were bunded.

In the Western Province strip cropping was well started and in Kigezi District stop wash lines of elephant grass (Pennisetum purpureum) continue to be planted.

There is little doubt that cultivators throughout the Protectorate are beginning to realise the value of leaving a strip of uncultivated land between their plots across the slope. This is a method of soil conservation which is readily understood by the peasant himself and astonishingly rapid progress is being made in some districts. The value of controlled grazing is also beginning to be realised by cattle owners and considerable progress has been made both in Buganda and in the Eastern Province by persuading the people to close overgrazed areas for a period sufficiently long for the pasture to recover.

(*b*) *Water Conservation.*—A Soil Conservation Assistant was appointed in April, 1942, and under his direction the work of dam construction in Teso District continues to go ahead rapidly and efficiently. Four dams ranging in capacity from 6 million to 40 million gallons were completed, of which Ajake, with a capacity of 6,200,000 gallons, was completed in 33 days at a cost of only £122. An interesting and useful development has been the construction of ataparin or small dams by the cultivators themselves. The construction of these ataparin is dependent on the presence of springs which do not dry up in the dry season.

(*c*) *Rural Development.*—In Buganda, work at Nsangi continued and a large number of trees, mostly eucalyptus, were planted. Six paddocks of 6½ acres each were marked out and demarcated with hedges. The major part of the cultivated zone, amounting to 2¼ square miles, has been contoured and divided into strips by grass stop wash lines. Gullies have been stopped and erosion completely checked. Little progress has, however, been made regarding resting of alternate strips, chiefly because the holdings are too small to spare enough land. A few occupants have been persuaded to use cotton seed manure and those who own cattle, to dung their land. Satisfactory progress has also been made with the other two major schemes, at Lwada in Mengo and Kiyimbwe in Masaka.

At Ajeluk in the Eastern Province, 28 acres of *Cassia siamea* for firewood were planted. Good progress was made with the bunding of paths and cattle tracks by the people themselves. A further spring was impounded to help the water supply.

The development of cultivators groups in Masaka District has been most successful; briefly these are groups of cultivators established voluntarily on mitalla, the members of which co-operate in putting into practice methods of soil conservation and improved cultivation as advised by the Department.

Soil Structure.

The Senior Chemist, after examining a large number of methods, found water-stable crumbs exceeding ½mm. size to be an efficient indication of soil structure and consequent inherent fertility. The Tiulin technique was applied to a number of fertility experiments and it was found at Serere and Bukalasa

that farm-yard manure merely feeds the crop and has no effect in reforming the structure of the soil. In the experiments where resting periods are included it was found that resting under grass regenerates the fertility of the soil by building up the crumb structure to a high level before cropping. It was found possible to construct a tentative empirical scale showing the relation between the percentage of particles over $\frac{1}{2}$mm. and the fertility level of the soil. In Buganda, red loam soils which had rested under elephant grass attained about 60% of these crumbs; in the short grass areas well rested silt loam soils attained about 40%. These percentages declined steadily with cultivation, falling as low as 30% after continuous cultivation in both areas and 20% if the destructive process is assisted by erosion. These results provide, for the first time, proof that, under local conditions, the resting period under grass does regenerate the structure of the soil and that manure does not, thus supporting the earlier field observations which led to the adoption of the grass resting period in 1934.

The application of the results to cultural practice must of course be conditioned by the population pressure in each area. The resting period must be adjusted not only on soil tests but on the land requirement of the community. Other things being equal the rest should be as long as is practicable even supposing that in three or four years the structure has become as good as it will ever be. The period of cultivation should also be as short as possible so that grass seeds still remain viable and natural cover for the resting period is quickly established. In areas where the pressure of population is so great that the period of rest is insufficient to restore fertility the solution lies in a more intensive form of cultivation. By better cultivation and the use of manure crop yields could be so improved that eventually much less land would be needed to produce the same return and the balance would be available for rest under grass.

Pasture Work.

In addition to direct investigation as to the effects of different grasses on soil structure, information is being collected at the major experiment stations on the use of indigenous and imported grasses as satisfactory cover during the resting period, with particular reference to their palatability to cattle and their effect on fertility. Work is also proceeding on the effect of varying intensities of grazing. At Serere and Ngetta, a vast amount of useful information has been obtained, but in the majority of cases, the experiments have not been going long enough for conclusive results.

Education.

Makerere Classes.—The 1941 5th year Makerere class consisted of seven students of whom four came from Uganda, two from Zanzibar and one from Kenya. All the students passed the final examination in December and the four Uganda students joined the Department as Agricultural Assistants in January, 1942.

The 3rd year class consisted of only two students. They spent the second half of 1941 at Makerere College and the first half of 1942 at Serere where they were given practical instruction in all aspects of agriculture and rural development.

The 1942 5th year class consists of 11 students—seven from Uganda, three from Kenya and one from Tanganyika; and they will be in residence at the College for the full year and not only for one term as was previously the practice.

Other Courses of Instruction.—At Bukalasa short courses of instruction were held for minor chiefs, cultivators and road headmen, the results being very satisfactory. The course for road headmen was primarily intended to teach the practical measures necessary to prevent soil wash which so frequently originates from uncontrolled "run off" water from Native Administration roads.

At Serere similar courses for chiefs and cultivators were held and those attending had the opportunity of visiting the prison farms, dams and ataparin which are such an important feature of rural development in Teso District.

A course for possible Rural Assistants was started at Serere in 1941 for men selected from Agricultural Instructors. In addition to their training in Agriculture these men will undergo periods of training with the Medical, Forestry and Veterinary Departments.

A large number of articles covering a variety of subjects and giving advice and information to farmers was published in the vernacular press.

SECTION III.—LEGISLATION.

No legislation affecting the work of the Department was effected during the period under review.

UGANDA PROTECTORATE

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE PERIOD

1st July 1942 to 30th June 1943

PRICE: SH. 1/-.

Published by Command of His Excellency the Governor.

ENTEBBE:
PRINTED BY THE GOVERNMENT PRINTER, UGANDA.
1944.

7378—490—6-44.

DEPARTMENT OF AGRICULTURE.

ANNUAL REPORT

For the Period 1st July, 1942, to 30th June, 1943.

FOREWORD.

The general failure of the short rains in 1942, coupled with a greatly increased demand for foodstuffs throughout East Africa and for export, made it essential to redouble our efforts to produce the greatest possible quantity of food crops in 1943. Careful production plans were worked out for each district and province and very large areas of all food crops were planted. As was foreshadowed in the preceding report, large scale maize production was undertaken and the response of the growers to the demand for a large acreage of this crop was most satisfactory. Hitherto maize production on a large scale had been considered unnecessary, [illegible]esirable use it is an erosion-permitting crop and, under Uganda [illegible] followed by cotton, thereby accentuating the problems [illegible]d erosion. However, it was accepted that the Protectorate of its precious fertility in order to provide foodstuffs for can Pool.

[illegible]f soy beans in Buganda resulted in a spectacular increase yields and guaranteed prices have provided a satisfactory so far practically the whole crop is sold, it is most probable growers will realise what a valuable addition to their diet

[illegible]creased production of rice met with a very satisfactory [illegible]wers who welcomed the opportunity to grow this crop which majority of them. It was unfortunate that the excellent [illegible]ators in Masaka District were to a large extent wasted owing [illegible]ions and to disease, but in the Eastern Province the results [illegible]l there is little doubt that the growers will continue to manent addition to their normal food supplies.

[illegible]his vastly extended programme of food production, every [illegible]nsure that a normal cotton acreage would be planted for [illegible]he 1942/43 cotton crop which was the smallest since 1924 [illegible]e marketed under the special arrangements made to ensure [illegible] Supply was able to get such cotton as it required at its [illegible]. Cotton Exporters' Group embracing all established cotton [illegible] in order to deal with the marketing of the crop. Prices to [illegible] grower [illegible]l on the Ministry of Supply's guaranteed price with a bonus [illegible]added in c[illegible]mpensate the growers in some way for the very small crop. The balance of the crop, not required by the Ministry of Supply, was sold to the exporters through the group and all profits made on sales were credited to a special cotton fund which has been set up and which will be used for the benefit of the cotton growing areas of the Protectorate. The fact that prices were fixed throughout the season, greatly assisted orderly marketing and relieved the grower of the anxiety he normally has, as to whether the price will rise or fall after or before he has sold his cotton. That it was possible to announce to the grower the minimum prices that he would receive in each zone for the 1943/44 crop had a very favourable effect on the preparations and planting for this crop.

There is no doubt that the policy of fixed and guaranteed prices for crops has been a most powerful weapon for ensuring maximum production. The marketing of all the important crops is now completely controlled by means of the Defence (Controlled Produce) Regulations, the Defence (Control of Cotton) Regulations, and the Defence (Control of Coffee) Regulations which enable orderly marketing and disposal to take place; they also ensure that the destination

of the crops concerned is completely under control and that flat *f.o.r.* or *f.o.b.* prices can be charged to the purchasers.

Although the staff of the Department was so heavily occupied with this increased production campaign, it was still possible to pay considerable attention to the vital matter of soil conservation and it is satisfactory to record that good progress has been made with strip cropping in most districts of the Protectorate. It is significant that in Teso it is now unnecessary to conduct any departmental propaganda for strip cropping as this method has been almost universally adopted and accepted by the people. The next stage will be to ensure the proper resting of land after cultivation for a limited period in order to preserve the crumb structure of the soil. This will be a more difficult hurdle, but as the cultivators have so readily accepted strip cropping, there is no reason why regular resting of their land, which is after all only a modification of their own old method should not be eventually accepted by them as normal practice.

The important part played by livestock in the agriculture of the Protectorate is reflected in the large number of investigations into cattle management now being undertaken at the experimental farms. Most of these investigations are of necessity long-term ones and results will not be available for some years. One of the most pressing problems is the provision of manure for the overcrowded areas around Kampala where insufficient land is available for resting. The use of township compost, coffee husks from the curing works, etc., is becoming popular, but the final solution may well prove to be the stall feeding of cattle by individuals; promising investigations into this problem are being made at Kawanda.

Considerable progress has been made at Bukalasa and Serere with the training of cultivators and minor chiefs: the courses given are short and they are received with enthusiasm by all concerned.

The ease with which the controls affecting primary produce have worked is in great measure due to the willing and unfaltering efforts of those unofficials, who so generously agreed to accept responsibility as Deputy Controllers, frequently without any remuneration.

The success of the planting campaigns which have resulted in a greater acreage under crops in the Protectorate than has ever before been known, despite the absence of a not inconsiderable proportion of the man-power of the Protectorate in the Army, has been largely due to the excellent co-operation which has been achieved between this Department and the Provincial Administration.

Finally, I would wish to pay a high tribute to the European and African Officers of the Department, who have continued to work under trying conditions without normal leave and recreation, and who have done so much to ensure that the crops required for the war effort have been planted. I should add that this tribute to the African members of the staff is not merely lip-service; they have shown that given the opportunity they are capable of accepting responsibility and they have carried on their increased duties with enthusiasm and success.

G. W. NYE,
Acting Director of Agriculture.

SECTION I.—AGRICULTURE IN THE DEPENDENCY.

Cotton.

1942–43 Crop.—The total acreage planted during 1942 amounted to 874,776 acres only compared to 1,287,256 acres planted in 1941. The main reasons for this large reduction were difficult weather conditions during the planting period and a widespread reluctance amongst growers to plant a normal acreage, owing to the low prices paid for seed cotton during the previous year and to the temporary suspension of marketing which had been necessary. The early rains in 1942 were late and so delayed the preparation of land. They ceased abruptly at the end of May, and June was unusually dry. The July rainfall was also below average.

August was a very wet month in all areas and some leeway was made with the backward state of planting. The rains continued to the middle of September but then ceased and the second rains, which normally continue until the middle of December, failed to materialize, hot and dry weather prevailing in all cotton growing areas during the critical growing months of the crop. The total quantity of seed cotton marketed amounted to 66,788 tons, and 112,849 bales were exported. Fixed prices were paid in all cotton zones, based on a price of Shs. 13 per 100 lbs. seed cotton for ARK. These guaranteed prices were very popular with the growers and resulted in the crop being marketed expeditiously. Grade was satisfactory although the quality of the lint was below average, owing to the very dry growing season. Buying was again restricted to three days in each week except in a few of the outlying districts, where daily rotational marketing was arranged.

The average price paid for seed cotton during the season in all zones was Shs. 13,18 per 100 lbs., and the gross return to growers was £985,516 as against £1,302,994 for the 1941/42 season's crop.

1943–44 Crop.—Widespread propaganda to ensure the planting of a normal cotton crop met with a good response and there was a marked tendency towards earlier planting. The guaranteed prices which operated during the previous season had a very reassuring effect on growers. By the end of June, 1943, it was estimated that 347,228 acres of cotton had been planted, compared to 93,955 acres to the same date in 1942. Weather conditions during the first half of 1943 were generally suitable for planting.

Coffee.

Eastern Province.—In Bugishu District, a crop of 2,264 tons of parchment coffee was marketed compared to 2,926 tons during the previous season. Prices paid to growers were slightly higher, being Shs. 1,44 and Shs. 4 40 per 4-gallon tin of cherry and parchment respectively. There was a general improvement in picking methods and the quality of native prepared parchment was higher.

Antestia damage to cherry was serious in South and Central Bugishu, which, combined with damage by *Stephanoderes*, caused a high proportion of "lights" at several buying centres. The general standard of cultivation was satisfactory, but lack of adequate material for the mulching of plots caused difficulties.

Irrigation of the central nurseries was carried out with good effect. The advantage of planting seed in the nurseries as fresh as possible after picking was again evident.

Western Province.—Higher prices resulted in greater attention being paid to this crop; many plots which had been neglected were resuscitated and there was an improvement in the general standard of cultivation.

In Bwamba County of Toro District, a record crop of 382 tons of robusta coffee was marketed, the price per pound having risen from 23 cents in 1941/42 to 28 cents. The crop was purchased, as usual, under an exclusive buying licence. The area under robusta coffee in Bwamba is now estimated at 900 acres. Coffee sales in the remainder of Toro District and in Ankole and Kigezi Districts were 460 tons of arabica, and 35 tons of robusta. Damage by *Antestia* and by Berry Borer continued on a normal scale and introduced parasites of these insect pests reduced the damage caused to a reasonable level where the parasites were present in sufficient numbers.

Buganda Province.—The control of all native produced coffee was introduced on the 1st November, 1942, and prices for the various kinds of coffee delivered at licensed curing works were fixed as follows:—

Robusta unhulled ..	14	cents per pound.
„ hulled ..	28	„ „ „
Arabica unhulled ..	16	„ „ „
„ hulled ..	36	„ „ „

High prices led to better cultivation and there was a fair demand for seedlings, of which a total of 439,147 were issued to growers.

Robusta seedlings of the "Nganda" type were issued in Mubende District instead of Arabica as previously, and the standard of cultivation with new plantings was particularly good in this district. Propaganda for the better drying of coffee continued and a number of buyers were prosecuted and convicted for purchasing wet coffee. The Government Coffee Grading Inspectors passed a total of 16,275 tons of coffee for export, of which 13,459 tons were Uganda Robusta F.A.Q., and U.G., and 638 tons were Uganda Arabica F.A.Q. and U.G.

Tobacco.

A very large crop of *fire-cured tobacco*, totalling 3,209,187 lbs., was marketed in Bunyoro District. Sales during the two previous years were 1,277,185 lbs., and 1,706,254 lbs. respectively. Despite this greatly increased production involving a large number of new growers, there was in improvement in the average quality of leaf marketed. Prices paid to growers were unaltered, *viz.*, 29 cents per lb. for Grade I and 19 cents per lb. for Grade II leaf. The average return per acre to growers was Shs. 99/59 compared to Shs. 102/94 for the 1941/42 season's crop.

In spite of local difficulties in nursery management owing to water shortage, there was an ample supply of plants for the 1943/44 season's crop, for which a production of 3 million pounds of leaf was planned, and an adequate acreage was planted under good weather conditions. Although hail damage in June was severe in some areas, general crop prospects were above average.

The *air-cured* crop in the West Nile produced 102,392 lbs. of leaf, which was purchased from growers at the same prices as in Bunyoro. This was an increase of 31,840 lbs. of leaf over the previous year's crop. The average cash return to the grower was Shs. 53/96 per acre.

48 acres of Jamaica Wrapper and Hickory Pryor were planted in the spring of 1942 in the Terego area of West Nile for *flue-curing*. Heavy wind and hail storms ruined a certain proportion of leaf when almost ready for picking. Green leaf was purchased from the growers at 4 cents per pound and curing took place from July to September, 1942. The total quantity of saleable cured leaf (a small quantity of which had to be air-cured) was 13,276 lbs., and this was sold to local manufacturing firms. The yield per acre of cured leaf averaged 221 lbs. Both quantity and quality of leaf produced from the first crop were considered satisfactory, taking into account the many preliminary difficulties met with. Owing to the virtual failure of the late rains in 1942, only 25 acres were planted as a second crop and the bulk of the leaf produced had to be air-cured. In 1943, the same acreage was aimed at and 50 acres were planted in March and April, in spite of food shortages and the preoccupation of growers with food crop planting.

It was decided to confine the cultivation of *high nicotine content tobacco* to Kigezi District, although small areas of this crop had previously been under cultivation by native growers in Ankole and Toro Districts. The 1942 spring planted crop of 250 acres produced 68,656 lbs. of dried leaf which was purchased at 10 cents per lb., giving a return to the grower of Shs. 27/50 per acre and an approximate yield per acre of 275 lbs. Analyses of nicotine content of the leaf from different centres showed a wide variation, with an average of about 7% and it is evident that the optimum altitude for this crop, the correct stage of ripening at which to pick the leaf and proper methods of drying have a great deal of bearing on nicotine content and have still to be determined. As with all other crops, the autumn 1942 planted crop suffered severely from drought; approximately 100 acres were planted and total purchases were 19,123 lbs. of dried leaf.

Oilseeds.

The maximum cultivation of groundnuts and simsim was encouraged. While growers made an excellent response to this need and unusually large acreages were planted, the drought at the end of 1942 very seriously reduced simsim yields and large proportions of both simsim and groundnut crops were utilised by growers for food, thus reducing the marketable surplus.

Groundnuts.—Total sales from the spring 1942 crop were 8,513 tons as against 2,888 tons in 1941 and 862 tons in 1940. Practically the whole of the 1942 production came from the Eastern Province. Although a large acreage had been planted in Teso, only a small quantity was marketed on account of the growers' fears of impending food shortages. The autumn planted crop in Buganda Province which usually produces a substantial amount for sale was ruined by dry weather. The 1943 production target was 20,800 tons, over 90% of which it was planned to produce in the Eastern Province. The requisite acreage was attained in Busoga and Mbale Districts, but unfavourable planting weather in Teso resulted in a greatly reduced acreage and necessitated a drastic reduction in the total estimate for sale.

Simsim.—Although a much larger acreage of simsim was grown, the drought from September onwards resulted in greatly reduced yields in all those areas where simsim is planted as a late rains crop, and a much larger proportion of this crop was retained for food than usual. Total sales during the period under review were 2,332 tons in the Western Province, 2,015 tons in Buganda and 997 tons in the Eastern Province, making a Protectorate total of 5,344 tons. Despite adverse weather conditions, these figures compare very favourably with production during the two previous years which was 960 tons in 1941, and 1,386 tons in 1940.

Shea Butter Nuts.—Small quantities of this crop have periodically been purchased by oil milling firms in Teso and Lango Districts in past years, and its importance for use in edible oils and for soap making resulted in considerable competition for the nuts in 1943, and very high prices were offered to growers. The total sales in March to June, 1943, were 842 tons in Teso District and 443 tons in Lango District.

Flax.

This small industry has developed steadily in Kigezi District and the crop has become a popular one with the native growers. Satisfactory yields of straw and seed have been obtained and the quality of the fibre produced has been well reported on by the Kenya Flax Grader, who visited the area in March, 1943. The crop is now being grown in twelve Gombololas mainly to the north of Kabale, also in a few Gombololas in the extreme west of Ankole District. The last crop which was planted in March and April, 1943, totalled 520 acres. Considerable difficulty has been experienced in processing the crop. A temporary factory was constructed in 1942, and commenced working in September, but a fire occurred in June, 1943, which necessitated storing all straw purchased from growers until the new factory at Kisizi has been completed.

Maize.

The total quantity of maize marketed from the 1st June, 1942, to 31st May, 1943, was approximately 10,000 tons. On account of the greatly increased demand for maize throughout East Africa and shortfalls in production, Uganda undertook as a war measure to produce this crop on a large scale during 1943. The production target set for the 1943/44 season was 60,000 tons, most of which was to be produced in Buganda Province with smaller quantities in the Eastern Province. Other producing areas for supplying internal requirements were Lango, Bunyoro and Ankole. Seed requirements for the increased acreage were met, partly by purchase of the late 1942 sown crop in Buganda, but mainly by the importation of 460 tons from Kenya, 130 tons of which were distributed to growers in the Eastern Province and 300 tons in Buganda Province, while small quantities were sent to Bunyoro, Lango and Ankole Districts. Planting conditions were generally favourable, although late arrival of seed resulted in good planting rains being missed in parts of the Eastern Province and part of Mengo District. The target acreage was attained.

Rice.

From a total production of less than 100 tons during the 1942/43 season, a target figure of 4,350 tons was aimed at during the 1943/44 season. 82 tons of seed were imported from Mwanza in 1942. Autumn cultivation of swamp rice was attempted in Buganda Province chiefly in Masaka District and some 1,500

acres were planted. Weather conditions, however, were against the crop from the seed-bed stage onwards and the crop was heavily attacked by "Blast" and other diseases. Practically none found its way on to the market as yields were very low and the small crop that was harvested was utilised by the growers for food or was retained for seed. The acreage planted in Buganda in the spring of 1943 was disappointingly low, owing to its previous unsatisfactory performance. In the Eastern Province, some 27,000 acres were estimated to have been planted in January to March, 1943, an acreage considerably in excess of the target figure, two-thirds of this acreage being in Mbale District. The varieties of seed used were partly Afaa and partly local. The crop made fair growth and marketing commenced on a small scale in June. A small crop of rice was grown in Bwamba County of Toro District and an increased acreage was planted there and in north-east Lango in early 1943.

Soy Beans.

Encouragement to increase soy bean production in Buganda was given throughout 1942 and seed stocks were increased during that year to enable larger scale planting to take place in 1943. The crop is a popular one in Buganda and there was a keen demand for all available seed. The acreage planted in the spring of 1943 was only limited by the seed supply and the area planted justified an estimate of 3,000 tons for sale during the 1943/44 season. Small acreages of soy beans were also grown in Bunyoro, Toro and Ankole for seed multiplication.

Other Food Crop Production.

The abrupt cessation of the late rains in the middle of September, 1942, in all parts of the country prevented the planting of the large areas of root crops, cereals and beans which are normally cultivated at this time of year to provide food during the first half of the following year. The direct result of this failure of the rains was local shortages of food in many districts between February and May, 1943, and many of the large labour employing firms experienced extreme difficulty in obtaining supplies for their labour. Every encouragement was given to swamp planting of sweet potatoes and instructions were issued for all surplus stocks of fresh foods to be dried and stored for future use. Another result of the failure of the rains was a lack of sweet potato planting material in many of the worst affected areas. Although food shortages were acute locally, the position was adjusted by a redistribution of food from more fortunate areas and no direct famine food relief was necessary. Reserves of stored foodstuffs were heavily drawn upon, however, and the huge areas of plantain gardens suffered severely. Special attention was given to increased food crop production in the spring of 1943, in an attempt to bring up the depleted reserves of food to their normal level. Although the early rains were heavier than usual, their arrival was delayed in many districts until April, with consequent loss of opportunities for planting. Measures were taken early in 1943 to purchase surplus stocks of dried foodstuffs particularly cassava in all areas where the local food situation warranted such a step, for export to other East African Territories in need of relief food. To the end of June, 1943, 6,224 tons had been exported. The bulk of this consisted of cassava purchased in Buganda, but considerable quantities also came from the Eastern Province.

Increased production of both wheat and rye was encouraged in Buganda and the Western Provinces. Rye is a new crop to this country and wheat had only previously been in native cultivation in Toro and Kigezi Districts. Rye seed was imported from Kenya and seed of the local variety of wheat from Toro was sent to those areas selected for increased growing of the crop. From the autumn 1942 planted crop of wheat, 177 tons were marketed in Toro and 22 tons in Kigezi. After reservation of seed for increasing planting in 1943, the balance of the crop was despatched to Kenya for milling. In the early rains of 1943, wheat seed from Toro was distributed in parts of Masaka District for planting, in addition to Kigezi and Toro. Seed from Toro was also sent to Bugishu District in September, 1942, for growing in the northern hill Gombololas.

As the result of trial plots of rye in various districts during 1942, increased cultivation was planned in Mubende, Toro and Ankole Districts during the early rains of 1943, with a view to using this crop as a partial substitute for wheat for Refugee Camps in Uganda. Although germination and early growth were satisfactory, the crop was later badly attacked by *Helminthosporium* sp. and yields were seriously reduced.

Non-Native Agriculture.

Rubber.—The Rubber Production Committee which was constituted early in 1942 continued to co-ordinate all measures for maximum production of rubber. Collection and preparation of wild rubber in the Mabira Forest was supervised by Messrs. The Mabira Forest (Uganda) Rubber Co., Ltd., and in the Budongo and Bugoma Forests by the Forestry Department. Production rose from approximately 450 tons exported during the twelve months ended 30th June, 1942, to 795 tons for the year ended 30th June, 1943.

Sugar.—Production from the two mills in Uganda totalled 51,000 tons. This figure is a slight increase over the production of the previous season.

Tea.—575 tons of tea were manufactured during the year, the three main areas of production being Kyagwe, Toro and Mityana. The increased output was due to plantings coming into production for the first time, but yields in general were adversely affected by the prolonged drought. All available cotton seed was utilized for manure wherever this could be spared from other essential war purposes.

Sisal.—The factory at Masindi Port operated throughout the year and 1,400 tons of all grades were exported.

SECTION II.—WORK OF THE DEPARTMENT.

Cotton.

BREEDING.

An important result of a visit by Mr. R. L. Knight of the Empire Cotton Growing Corporation, Sudan, was the adoption at both Kawanda and Serere of his genetic method of approach to the Blackarm problem. While most of the important strains at Serere possessed genetic resistance to the disease and only required sorting, no such gene was contained in the main Buganda variety BP.52 and in this case it was necessary to effect transference of resistance by repeated back-crossing, B.181 supplying the required gene. Using the same principle, a start was made on the following aspects of cotton production: Wilt; increase of ginning outturn; production of finer lint; reduction of susceptibility to *Lygus* damage.

Since commercial BP.52 seed of the 1941/42 crop showed impurity, a start was made at Kawanda on the supply of pure BP.52 seed. Improvement of ginning percentage by removal of black seeds prior to sowing was done at both cotton stations, but no method has been devised to remove black seed on a commercial scale.

In district trials, B.181 exhibited outstanding resistance to Blackarm. Despite its susceptibility to this disease BP.52 gave remarkably good results—as judged by yields—in extensive trials in the eastern areas; in these trials also BP.50 and B.181 produced better lint than at Bukalasa, their place of origin.

SEED DISTRIBUTION.

Introduction of BP.52 into Singo County in 1942 completed its extension in Mengo District. Further westward extension into the remainder of the Mubende–Toro Zone, Bunyoro, and a small isolated area of West Nile was arranged for the 1943/44 season. The very small 1942/43 crop in Teso, Lango and Acholi necessitated augmentation of local seed supplies of N.17 in the two first-named districts and in East Acholi Zone, and the replacement of SG.29 in

West Acholi Zone with BP.52. Changes of strains previously grown were also made in the following areas: BP.52 to an area of South Central Zone; X3 mixture to a small part of Masaka District (as the first step to replace the old local variety); N.17.M.2—a mass selection to Bunya and Butembe County of Busoga; B.181 sufficient for sowing 450 acres in the Lalle peninsula of Teso.

CULTIVATION.

Interplanting trials of cotton and legumes continued at Serere and Ngetta. At neither centre was the combination of cotton with cowpeas successful, the yield of cotton being considerably depressed. At Serere, there was considerable damage by *Lygus* to the cotton in this combination, cowpeas being a host plant of the insect. Cotton interplanted with tepary beans was again a successful arrangement, particularly at Ngetta with cotton planted in May.

The cotton gap-filling experiment was repeated at Ngetta, but the Serere experiment was spoiled for lack of sufficient rain to establish the requisite initial plant population. Results again indicated the importance of establishing a good stand at the first sowing. Another experiment at Serere showed that the yield of cotton is affected by neighbouring grass strips up to a distance of about three yards.

PESTS.

Work on *Lygus* as a pest of cotton was advanced by investigations of its parasites, which proved to be the factor in the elephant-grass areas mainly concerned in confining severe damage to the early sown crop and in reducing the amount of damage in these areas as compared to the hotter and drier parts of the Protectorate. The experiment to test the effect on the incidence of *Lygus* of growing sorghum in close proximity to cotton was repeated at Kawanda. No reduction of incidence was noticeable and this was ascribed to the protection to the pest given by the compact type of seed heads of the sorghum, thus preventing attack by the parasites. Physiological conditions and changes in the cotton plant in relation to *Lygus* attack continued to be studied. Much attention was paid to hairiness as a factor possibly concerned in resistance.

Coffee.

ARABICA.

Existing experiments at Bugusege were maintained, but no new facts emerged during the season. A comprehensive fertility, cultural and spacing experiment was worked out and shade trees were planted in the appropriate section of the experiment. No further results of value were evident from the time-of-pruning trial, owing to the poor condition of the trees. Varieties of plants that may prove to be suitable for inter-row washbreaks in coffee were maintained and added to. Kent's maintained its superiority over other varieties in the Bugishu variety trial plots.

In the Western Province, variety and shade experimental plots were maintained at Kyembogo Farm in Toro and at centres in Kigezi and Ankole Districts. Fair growth of Kent's was made at Kyembogo Farm on the plot to be used for supplying seed requirements for this Province.

Investigations continued on the control of *Antestia* by the parasites *Epineura* and *Corioxenos*. Parasitism by *Epineura* was found to have been greatly reduced in one area by the creation of conditions unsuitable to the parasite, caused by clean weeding around the bases of the coffee trees, and the *Antestia* population had greatly increased in consequence.

A large number of *Antestia* parasitised by *Corioxenos* were introduced from Toro into two localities of Bugishu in July, 1942. The insects travelled well and the parasite was found in April, 1943, to have become established, at least temporarily, in one of the two localities though it was not to be found in the other.

ROBUSTA.

Heavy crops were borne on the older plots at Kawanda, a yield of 22 cwts., being obtained from the 1937 planted mulched Robusta plot. Yields from Nganda trees were less than from Robusta in both the 1935 and 1937 planted plots.

Individual tree records were maintained. The drought at the end of 1942 greatly affected the trees, causing much dieback, especially on the heaviest yielding trees. In the coffee costings trial, mulched plots made the best growth and picking on these commenced later than on the clean weeded plots. Coffee interplanted with bananas made almost as good growth as the unmulched plots, but coffee planted amongst established bananas was stunted. The coffee with interplanted elephant grass made irregular growth and some of the infills failed to survive.

Food Crops.

The first of the *Cassava* mosaic elimination trials at Serere designed to give the maximum opportunity for infection, was completed. Of a total of seventy-one varieties planted sixteen survived the most rigorous test; of these, three were local varieties and thirteen derived at various times from Amani. From these varieties (and any others that may appear later), it is hoped to isolate some with the required agricultural characters, taste, and keeping quality.

All work on *Soy beans* is now being organized from Kawanda, where routine variety trials were maintained. A trial at Ngetta added to previous information on sowing date and spacing; a full range of combinations was tested and it would seem that close spacing within the row is particularly important.

Further work on B.239 and Atuboi *Groundnuts* at Serere and Ngetta confirmed the high yielding capacity of the former (though it has other drawbacks) and the advantage of March sowing. Samples of nuts drawn from the sowing date and variety trial were analysed by the Chemical Section; the results showed that climate often has a greater influence on the oil content than either variety or soil.

Work continued on tests of different varieties of all local food crops and on propagation of the more promising types. New crops tried out included rye, and varieties of wheat, rice and English potato.

Production of vegetables for both local consumption and export was greatly increased. Efforts to establish local supplies of vegetable seeds gave promising results.

Cinchona.

Reports received from Messrs. Howards on the quinine content of samples of bark from individual trees enabled twelve further selections to be made on this basis, on thickness of bark and on girth of tree; seed of eleven such selections was sown in March, 1943. Of these samples of bark one gave a quinine content of 15·7%, the highest figure ever recorded from their laboratory. Nurseries were prepared at Kyembogo Farm in Toro to raise sufficient seedlings to plant up to 20 acres of cinchona on this farm. Good growth was made and transplanting was expected to take place in the autumn of 1943. The area under quinine at Kachwekano Farm, Kigezi, was increased slightly.

Animal Husbandry and Pasture Work.

The installation of a cattle weighbridge at Serere greatly improved facilities for livestock breeding and feeding investigations and brought to light some interesting preliminary data regarding the effects of wet weather on the health of calves. Various grazing trials were continued, all cattle used in these trials being weighed at regular monthly intervals; a new grazing management trial was started to test the effect of grazing by tethered cattle and of continuous and rotational grazing of one and two months' duration followed by similar periods of rest from grazing.

At Ngetta, experiments on the establishment and carrying capacity of pastures and their composition and on the establishment of live hedges continued.

Stall feeding trials were continued at Kawanda. The main object of these trials is to try out the feasibility of small-scale stall feeding of store cattle by Africans in those areas where overcrowding precludes the introduction of 2 to 3 year fallow under grass. In these areas, the aim is to develop a market-gardening technique using manure to maintain fertility in place of the grass

rotation proposed for less densely populated areas. The cattle used in the trials were obtained from Teso and housed in a cob shed with an open yard. Foodstuffs used were such as could be reasonably obtained by an African farmer and included elephant grass, cotton seed and sesame cake. Records of food consumed, manure produced, etc., were kept. Three lots of cattle were fattened off during the year and sold at a satisfactory profit, and it is clear that this system would be a remunerative one to local Baganda farmers if correct housing and feeding conditions are adhered to. In view of the increased interest shown by Africans in pig keeping, pedigree stock from Kenya was purchased for breeding at Kawanda and subsequent distribution; of two litters produced, 18 were sold to local farmers and two were retained for further breeding. Open range work in poultry continued at Serere, Ngetta, Kawanda and Bukalasa.

Rural Reconstruction.

Satisfactory progress was made at the special demonstration centres and the value of these is being recognised by the increasing number of visitors. Fuller details are contained in the Soil Conservation Report for 1943.

The development of cultivators' groups in Masaka District is one of the most encouraging features of rural reconstruction work. These groups are trained in their own villages and their members undertake to carry out improved methods of agriculture, animal husbandry, etc.

Soil conservation continued to be regarded as a matter of major importance. Strip cropping is spreading to most districts and is being increasingly accepted by farmers as the normal method of cultivation.

Preparations for the training of Rural Assistants were made at Serere, where it is expected a full course will be in operation during 1944.

Further dams were constructed in Teso District under the supervision of the Soil Conservation Assistant. Extension of this valuable work is hindered by the lack of equipment and difficulties connected with spare parts.

Soil Structure.

Further progress was made in the research on regeneration of crumb structure of soils. A simplified and better method of measurement of crumbs in samples was devised which makes possible the rapid examination of material in connection with the work on grass rotation. The results of field experiments showed the necessity to reduce after-cultivation to a minimum (consonant with the removal of weeds) to ensure maintenance of desired soil structure even for a three-year arable period.

Manures.

A compost factory was set up which should produce initially 5,000 tons a year from Kampala township wastes. The output is reserved for application to African farms within a radius of five miles and is intended to provide a suitable manure for regenerating soil in overcrowded areas adjoining the town.

The urgent need of phosphatic manure in cereal growing areas of Kenya led to a survey of cotton seed ash heaps near ginneries as a source of supply. Most of the heaps had been exposed to weather for years and the soluble phosphate content ranged from about 8% to nearly 25%. Over 2,000 tons of this valuable fertiliser were supplied to Kenya.

Education.

Short courses were held at Bukalasa for muruka chiefs, farmers, school teachers and road foremen. Training was also given to a number of departmental instructors and apprentices. A short course on meteorology was also given. Nearly three hundred muruka chiefs in Buganda have now attended these training courses and practical results are now becoming apparent.

At Serere, twenty courses each of one week's duration were provided for chiefs and cultivators, many of the parties being from one mutala only. The composition of some of the parties was varied by the inclusion of a number of school teachers and peasants in place of chiefs. Two Makerere students were in residence throughout the year. The training farm for the teaching of Rural Assistants was maintained and improved special attention being paid to the cultivation of foods rich in vitamins and mineral content for consumption by the Rural Assistants, the first course for whom was scheduled to commence later in 1943.

Advice to mission centres and schools was given by Agricultural Officers on tour when opportunities permitted. An increased number of articles was written for the vernacular Press dealing with various agricultural topics.

Miscellaneous.

A considerable amount of the time of field officers of the Department was taken up by the organizing of increased production and marketing of crops. The Senior Economic Botanist was appointed Rubber Controller. The Senior Plant Pathologist continued to advise on sugar production.

Legislation.

Under the Defence (Controlled [illegible]) Regulations, 1942, enacted in December, 1942, the Director of [illegible] ppointed Controller with power to regulate the marketing and [illegible] ain specified crops, the prices to be paid to the grower and [illegible] al of each crop. Oilseeds were also brought under control [illegible]

The Defence (Contro[illegible] [illegible]s, which came into force in October, 1942, brought all [illegible] [illegible]ffees under control.

In January, 1943, steps [illegible] er the Defence (Control of Cotton) Regulations, 1943, to establish [illegible] porters' Group through which all cotton marketed during the 1942/43 [illegible]s sold. Parallel legislation to deal with the crop grown in the Lake Provinc[illegible] [illegible]nyika, was enacted in June, 1943.

In view of the severe shortage of [illegible] many areas of the Protectorate resulting from the failure of the late [illegible] a Famine Commissioner was appointed in January, 1943, under Defe[illegible] ion with wide powers to direct all movements of foodstuffs throughout [illegible]ountry and to take all necessary steps to ensure a proper distribution of available supplies.

IMPERIAL MYCOLOGICAL
8 NOV 1945
INSTIT

UGANDA PROTECTORATE

ANNUAL REPORT

ON THE

DEPARTMENT OF AGRICULTURE

FOR THE PERIOD

1st July, 1943—30th June, 1944

PRICE: Sh. 1/-

Published by Command of His Excellency the Governor

ENTEBBE:
PRINTED BY THE GOVERNMENT PRINTER, UGANDA
1945

10195—520—9-45

DEPARTMENT OF AGRICULTURE.

ANNUAL REPORT

For the Period 1st July, 1943, to 30th June, 1944.

FOREWORD.

For the second year in succession, agriculture throughout the Protectorate was seriously handicapped by the abnormally low rainfall from August to December, 1943. The most serious result of this lack of rain was its effect on the food position as the autumn planting of food crops could not be carried out on a normal scale. Despite an extensive swamp planting campaign which met with varying success in different districts, it became necessary to import supplies of relief food, the distribution of which continued until June, 1944. That the requirements of relief food were not greater was due to the very satisfactory response made by growers in all districts to the advice to plant additional acreages of root crops and to the reasonably favourable weather conditions which occurred during the first half of 1944.

Uganda was again called on to produce a large crop of maize, partly to assist the general food situation in East Africa, and partly to satisfy the Protectorate's internal requirements. A substantial crop from Buganda was exported to Kenya, the balance from other areas being utilised for meeting local requirements. Legislation was enacted under the Defence Regulations to deal with the marketing and inspection of the crop prior to export. It was realized that the continued cultivation of maize on a large scale would have serious effects on soil fertility, but the urgency of the general food situation outweighed these considerations. Other crops which have assumed an important place in war-time agricultural production are oilseeds, rye, and soya beans, and the maximum production of these crops was planned in those areas best suited to their production. While the tonnage of groundnuts marketed was very similar to that of the previous season, the simsim crop suffered severely from the failure of the late rains and production was approximately halved. Rice cultivation was confined to the Eastern Province, the crop being milled locally. Although the milling of rice is a war-time innovation in Uganda, the initial difficulties were overcome satisfactorily and a reasonable product was made available for local consumption. The resultant crop of twelve hundred tons of paddy rice, which would have been considerably higher under more favourable growing conditions, was a valuable contribution to the country's food supply. The cultivation of soya beans was taken up with enthusiasm in Buganda Province and the range of cultivation of this crop was extended to other districts. The consumption of soya beans by growers is at present at a very low level, but methods of popularising the crop are constantly being reviewed. The construction of a factory at Jinja by a local firm to produce various soya bean products was commenced and this should assist considerably in establishing the crop on a sound basis.

The 1943/44 season's cotton crop was marketed under ideal weather conditions and the total number of bales exported was nearly double that of the previous season's low figure. Planting of the new season's crop commenced later than usual owing to the urgent need for increased food crop planting. It was evident, however, at the end of June, 1944, that a satisfactory acreage would be planted.

During the period under report, the mraketing of non-native Robusta coffee was brought under control for disposal as required by the Ministry of Food. A large crop was harvested in all districts and the Bugishu Arabica crop was only 500 tons less than the record crop of 4,156 tons marketed in the 1939/40 season. In regard to other crops, the production of rubber was maintained at its highest possible level and wild rubber was exploited to the full. The flax industry in the Western Province developed steadily and a promising grade of fibre was obtained. The new factory in Kigezi District started to operate towards the end of 1943. In this district, also, the acreage of tobacco for nicotine extraction was extended. With the experience gained during 1943 in the marketing and processing of primary produce, it was considered advisable to amend and bring up to date the Defence (Controlled Produce) Regulations which ame into force in December, 1942. By the terms of the amended Regulations, all types of produce were divided into primary and processed produce, and greater control in the marketing and disposal fo each type was effected. From the 1st January, 1944, the "Tripartite Produce Agency" was appointed by the Director of Supplies as agent to the Control for certain types of controlled produce, to undertake their collection, processing and disposal on behalf of the Control.

In spite of a greatly depleted staff and prolonged tours, the normal activities of the Department were well maintained. The various experiment stations carried out their programmes on all the more important aspects of work and steady progress was made in most areas in the adoption of soil conservation measures. A promising trial was continued at Kawanda into the possibilities of stall-feeding of store cattle in Buganda relative to the improvement of the local meat supply and the maintenance of soil fertility. The acquisition of a weigh-bridge at Serere greatly facilitated animal husbandry investigations, work on which is now becoming more important each year at this station. Experimental work on the establishment and treatment of pasture land continued at Ngetta Farm in Lango District.

Agricultural education received its due share of attention during the year and the courses of training at Serere and Bukalasa for chiefs, farmers, schoolmasters and apprentice instructors were maintained at their normal level. In addition, a course for rural assistants was continued at Serere and preparations were made for a similar course to commence at Bukalasa.

The progress I am able to record reflects credit on all concerned and I wish to express my deep appreciation of the ready assistance accorded to my Department by the Director of Supplies, the Deputy Controllers of Agricultural Produce and to the agencies concerned with its marketing.

A. S. RICHARDSON,
Director of Agriculture.

SECTION I.—AGRICULTURE IN THE DEPENDENCY:

COTTON.

1943–44 Crop.—Although weather conditions during the planting season were not very favourable, 1,232,099 acres of cotton were planted as compared with 874,766 acres during the previous year. The autumn rains failed for the second year in succession and the last quarter of the year was extremely hot and dry, particularly in areas removed from Lake Victoria. Cotton planted after mid-July produced a negligible crop. The total quantity of seed cotton marketed was 112,011 tons compared with 67,416 tons from the 1942/43 crop. The total number of bales of lint exported was 190,554. Prices to the grower were based on the Ministry of Supply's guaranteed price of Shs. 12/- per 100 lbs. of ARK, plus an increased cost of living index assessed at 85 cents per 100 lbs. of seed cotton, with normal premiums and discounts for other

growths. The guaranteed price for the season, together with restriction of buying to three days each week, encouraged orderly marketing. The average price paid for good raw cotton throughout the Protectorate was Shs. 13/18 per 100 lbs. The gross cash return to growers was £1,647,552 as against £985,516 for the previous year's crop.

1944–45 Crop.—Conditions were adverse to large-scale early planting. Food scarcity was a serious problem throughout the Protectorate in the first half of 1944 and maximum food planting was the prime duty of cultivators. Rainfall was light in the lake areas during May and June and only small plantings took place. Large quantities of other crops, particularly maize, were urgently required and the increased acreages of these crops may have been obtained, to some extent, at the expense of cotton planting.

Coffee.

Eastern Province.—Purchases of Arabica coffee in Bugishu District were 3,679 tons of parchment equivalent, the previous season's crop being 2,263 tons. Average prices (per 4-gallon tin) to growers were Shs. 1/59 for cherry coffee and Shs. 4/77 for parchment, equivalent to 27 cents and 25 cents respectively per lb. of parchment. This represented a 9% increase over last season's prices. Measures were taken concerning neglect of plots, which was tending to become too common and a satisfactory response was obtained. Insect damage, assessed by count, was 10·5% as compared with 9·0% in the previous year. *Antestia* damage was severe. A drastic pruning campaign was initiated and carried through and a drive for shade planting and for the provision of wash-breaks was started.

Western Province.—Sales of Robusta coffee in Bwamba County of Toro District ammounted to 234 tons. Yields fell as a result of the record 382 ton crop in the previous year. The price was based on 28 cents per pound of hulled coffee and the crop was purchased under exclusive licence. A further 500 acres of new coffee were planted, bringing the total acreage in Bwamba to 2,000 acres, which is probably close to the saturation point for this area. Coffee sales in the remainder of Toro District and in the rest of the Western Province together amounted to 314 tons Arabica and 26 tons Robusta. *Antestia* was especially troublesome in Ankole and this pest and the incidence of Berry Borer increased in Toro District.

Buganda Province.—Very dry weather in the last quarter of 1943 caused premature ripening and die-back and this greatly reduced the quantity and quality of the crop. Increased plantings took place in all areas, reflecting the general satisfaction of growers with the level and stabilisation of prices. Conditions for drying the crop were excellent and very little action had to be taken to control the purchase of wet coffee. There was also a marked improvement in the care of plots. 661,907 seedlings were issued to growers.

16,020 tons of coffee were passed by the Government Coffee Grading Inspector for export. Of this total, 14,043 were Uganda Robusta F.A.Q., and U.G., and 827 tons Uganda Arabica F.A.Q and U.G. (Bugishu coffee not included).

Tobacco.

A record crop of fire cured tobacco, amounting to 3,753,795 lbs., was marketed in Bunyoro District. Average quality of leaf fell slightly as a result of extensive hail damage and very wet conditions during curing. Prices paid to growers were increased by one cent per pound as compared with the previous year, Grade I leaf being purchased at thirty cents per pound and Grade II leaf at twenty cents per pound. The average return per acre to growers increased from Shs. 99/59 for the 1942/43 season to Shs. 104/09.

Dry conditions at planting time and the high economic return from food crop planting were the prime factors in causing a big reduction in tobacco acreage planted for the 1944–45 crop with the consignence that it appeared unlikely that the total sales would exceed 1½ million lbs.

Production of air-cured tobacco in the West Nile was 83,644 ibs., as compared with 102,392 lbs. in the 1942–43 season. The average cash return per acre to growers increased by Shs. 34/32 to Shs. 88/28. Quality also improved.

Prospects of air-cured tobacco production for the 1944–45 season in the West Nile were distinctly poor, acreage falling sharply on account of drought and food shortage. Cultivation of this type of leaf was opened in one specially selected area in Bunyoro, the production aimed at being 200,000 lbs.

Two experimental crops of flue-cured tobacco were grown in the West Nile. Approximately 8 tons of cured leaf were produced from the spring sown crop and were sold to local manufacturing firms. The late sown crop produced a negligible quantity of leaf owing to the almost complete absence of rain.

Good progress was made with the cultivation of high nicotine content tobacco in Kigezi District as is shown by the following figures :—

Season.	Acreage Planted.	Sales (in lbs.)	Yield par acre.	Return per acre.
1942/43 Spring	250	68,656	275	Shs. 19/10
1942/43 Autumn	100	19,123	191	Shs. 27/50
1943/44 Spring	140	73,910	528	Shs. 52/80
1943/44 Autumn	225	155,192	690	Shs. 69/00

Oilseeds.

Maximum production of oilseeds was again encouraged. Large acreages were planted, but the bulk of the simsim crop was ruined by failure of the late rains and the shortage of food dissuaded many growers from selling their groundnuts.

Groundnuts.—Total sales were 8,750 tons, the preponderance of which was grown in the Eastern Province. Production during the previous season was 9,313 tons. Large acreages planted in the spring of 1944 were affected by drought and prospects were unfavourable.

Simsim.—2,858 tons of simsim were produced, largely in Buganda. The northern areas, which normally produce the bulk of the crop, experienced a severe drought from the beginning of October and large acreages sown with simsim produced nothing at all.

Shea Butter Nuts.—The demand for this wild product for oil extraction was very keen and prices were high. A total of 1,553 tons of nuts was marketed as compared with 1,285 tons during the previous season.

Maize.

Maize production during the 1943–44 season was organised to provide an exportable surplus to alleviate the cereal shortage in East Africa. The objective was 60,000 tons and the requisite acreage was planted largely with seed obtained from Kenya. Because of general and acute food shortage, consumption of the ripening crop by the growers was very heavy. The quantity marketed was 23,300 tons which, though substantially below the target was three times that of the previous year. Valuable advice and assistance were given in connection with marketing and inspection by officers of the Kenya Department of Agriculture. The marketing and export organisation worked very successfully and there were no complaints as to quality. Failure of the late rains reduced the autumn sown crop to small proportions of which all was required for local consumption.

A further maize crop for export to Kenya was again required in 1944 and although, normally, the policy in Uganda is not to grow large areas of maize, further extensive plantings were encouraged. The main crop promised well, particularly in Buganda Province.

Rice.

The production objective was 4,350 tons. Plantings in Buganda Province were small, owing to the severe incidence of disease on the previous season's crop. The bulk of the crop was produced in the Eastern Province, where an acreage in excess of the target figure was planted. Inclement weather, food shortages and the ravages of root and leaf diseases combined to reduce the quantity marketed. Sales amounted to 1,226 tons only. An endeavour was made to increase production in 1944–45 to 8,800 tons and larger acreages than hitherto were planted in the spring of 1944 in the Eastern Province. In Buganda Province, other cereal crops, notably maize, were preferred to rice and little planting took place. Early incidence of Blast disease and Leaf Spot and the growing popularity of the grain for consumption by growers made it likely that actual sales would fall far short of the objective.

Soybeans.

Large scale planting of soybeans took place in Buganda, where conditions had shown themselves suited to the crop and where large seed supplies had been built up. Approximately 4,000 tons of soybeans were marketed during the year under review, mainly in Buganda, although production in the Western Province made good progress.

This crop gained favour as a food and small amounts were consumed by growers in the lean period of late 1943 and early 1944. Cultivation of soybeans was extended to new areas in Mengo and Mubende, also to Busoga and Lango Districts.

Wheat and Rye.

The maximum production of wheat was encouraged in Toro and Kigezi Districts, but yields were reduced by unfavourable weather and by disease. The production of rye was continued in Mubende, Ankole and Toro Districts, but in view of the susceptibility of this crop to disease it was decided to discontinue its cultivation.

Food Crop Production.

As a result of the failure of the late rains in 1942, reserves of stored food which had been accumulated over a number of years were largely depleted and stood at a lower level than they had reached for many years. Fickle rains in early 1943 prevented replenishment of granaries on any considerable scale and food remained scarce. Good progress was made in planting root crops whenever weather conditions permitted. The position had improved materially in September, 1943, particularly in the Lake Victoria region. Plantain gardens began to recover from the drought and large acreages of beans were planted. The autumn rains, however, failed for the second year in succession. From early October fainfall was scanty and in some of the northern and eastern areas no rain of value to crops fell for a period of five months. Food supplies dwindled rapidly and an immediate estimate was made of the quantity of food likely to be required before the new harvest which could not be provided from local reserves and surpluses. Issue of relief food to distressed areas was started late in 1943 and continued until the middle of 1944. The bulk of the issues consisted of a composite flour of cereals and oilseeds, but some maize from the Sudan and various local foods such as beans, soybeans and simsim were also issued. A drive was launched early in the dry season to obtain maximum planting of sweet potatoes on lake and swamp borders to provide some food and to preserve planting material. Very large acreages of all food crops were

planted as soon as the spring rains broke. By the end of June, 1944, the issue of relief food was reduced to comparatively small proportions. Variable weather interferred with the growth of the new crops and stablisation of the food position depended largely upon good autumn rains.

Non-Native Agriculture.

Rubber.—Maximum possible production of plantation and wild rubber was maintained under the aegis of the Rubber Production Committee.

Sugar.—The total output of the two Uganda Mills was 42,530 tons of refined sugar. The crop suffered from the very dry weather and production was slightly below the average.

Tea.—A substantial increase in tea output resulted from new plantings coming into plucking. 825 tons were manufactured as compared with 575 tons during the previous year.

Sisal.—The amount of sisal produced, including all grades of fibre and tow, was 1,892 tons.

Tobacco.—Small acreages of virginia-type flue-curing tobacco were grown on estates in the West Nile District. Leaf of a satisfactory quality for local manufacture was produced.

SECTION II.—WORK OF THE DEPARTMENT.

Cotton.

Breeding.—The development by genetic methods of strains resistant to Blackarm as described in last year's Report, was continued at both Kawanda and Serere. The simple sorting of Serere strains possessing genetic resistance to Blackarm was completed and resulted in 328 resistant genotypes representing 56 parent strains. The longer process of back-crossing to B.P.52 is still in progress at Kawanda, but resistant genotypes are being derived from each successive back-cross, as it is possible that the best agricultural type, with the requisite staple, may be reached before the prescribed programme of seven-fold back-crossing is complete.

In district trials, B.181 (which is markedly resistant to Blackarm as it stands) gave the highest yields in the Eastern Province, and notably in Usuku, where it was better than the local variety, S.P.84, in every respect. In north-west Uganda, S.2103, a mass selection from N.17, out-yielded B.181.

Seed Distribution.—For planting in the 1944–45 season, B.P.52 was supplied to the whole of the South Central Zone and to the Madi section of the West Nile–Madi Zone. X.3 mixture (B.P.52 and B.181) reached a further stage in the North Teso Zone. The multiplication of mass selections from N.17 proceeded in the Teso Segregated Area and in Busoga.

Cultivation.—The series of trials on gap-filling at Serere and Ngetta was concluded. The trials covered a wide range of treatments bearing on planting practice and in no circumstances did gap-filling lead to an increase in yield. Using a basic spacing of 3 feet by 1 feet, a stand of approximately 50 per cent. without gap-filling brought about a reduction in yield on only one occasion in four. At this spacing, therefore, a reasonable initial germination is all that is required.

Pests.—A substantial advance was made in the systematic study of the genus *Lygus*, its parasites, and their biological relationships. A fairly comprehensive picture was obtained of the annual course of the *Lygus* cycle in both the short and long grass areas, as represented by Serere and Kawanda respectively. Studies of the relative susceptibility of different cotton varieties to *Lygus* attack included detailed recording of the effect of the pest on the growth and development of the plant, and examination of the possible protective value of plant hairiness.

Coffee.

Arabica.—It was confirmed in Bugishu that Kents Arabica was the best variety so far tested. Other experiments were maintained according to their prescribed treatments and produced no interim information of note.

In the Western Province, the variety trial at Bushenyi in Ankole produced a small crop. Kents Arabica was outstanding in appearance at this trial. At Kyembogo Farm in Toro, the plot of Kents Arabica, designed to supply the Western Province with seed, gave promise of a good first crop. At Kawanda, Kents Arabica produced two-and-a-half times the yield of any other variety. Individual trees of wild strains introduced from Abyssinia and elsewhere also showed much promise.

The campaign in Bugishu against the Stem Borer, Bixadus sierricola, proved so successful that this pest became a rarity.

Robusta.—For the first time, the yields of Robusta Nganda exceeded those of Robusta in the 1935 plantings at Kawanda. The crops from these plantings were lighter than in the previous season being, respectively, 10·7 and 13·5 cwts. of clean coffee per acre for Robusta and Robusta Nganda.

The dry weather was very injurious to mature coffee at Kawanda, the effect being greater on trees interplanted with Leucaena glauca, bananas and elephant grass (Pennisetum Purpureum) than where plots were clean weeded or mulched with elephant grass. Both Robusta and Robusta Nganda with elephant grass mulch gave higher yields than with any other treatment.

It was interesting to note that the Albizzia stipulata trees planted as shade in the coffee were even more affected by the drought than the coffee trees; they suffered from gummosis and set abundant seed.

Food Crops.

The Cassava Mosaic elimination trials were continued at Serere, and the formal testing of resistant clones for agricultural characters, taste and keeping properties was begun. The resistant clones were also grown for observation at eleven sub-stations in different parts of Uganda. Resistance to mosaic was well maintained under conditions which were, locally, exceedingly severe. Testing for other characters will take some time, but present information justifies a short-list of seven varieties for provisional multiplication. Brown Streak disease was found in Uganda by Dr. Storey and Mr. Nichols of Amani.

A disease of sweet-potatoes, known for some years in the Belgian Congo, was found at Kawanda in March, 1944. It has all the symptoms of a virus, although this has not yet been confirmed by the recognized tests. A preliminary survey has shown that the disease is to be found all over Uganda, but is most severe in the south-west and is much less noticeable to the north-east of Lake Kyoga. Contact was established immediately with the *Institut National pour l'Etude Agronomique du Congo Belge,* and with Amani, Kew, and Cambridge.

Irish Potato Blight (*Phytophthora infestans*)has not troubled Uganda this season. Work at Kawanda in the presence of the other usual diseases has indicated that the local blue potato (probably Skerry Blue) is the most productive variety under these conditions. Unfortunately this type stores for an even shorter period than the average Uganda potato.

Serere has established that groundnuts should be sown at the earliest date at which there is a reasonable prospect of establishing a good stand without resowing. This usually works out at about the second week in March. Later sowings suffer increasingly from rosette, and yield very much less. It is now recognized that the high yielding 2-kernel Spanish nut, B.239, will never make any widespread appeal. The big Virginia nut, B.227, always only a moderate yielder at Serere, has done well at Kawanda.

The soybean variety R.184 from Potchefstroom gave by far the cleanest glass-hard sample at Kawanda. This crop is troublesome on the drying and threshing floor, particularly in humid areas, and a fool-proof sample is a valuable character. It also ensures good germination. No other variety has yet given a convincingly higher yield than R.181. It is now well established that close spacing in the row is essential for high yield. On the other hand, there is little to commend a row width of less than two feet. Work on inoculation with the symbiotic bacterium has been started at Kawanda. Good nodulation has been obtained, both in the immediate crop and in a succeeding crop planted with uninoculated seed on the same land.

Cinchona.

Further analyses of bark from trees of varying girth supported the hypothesis that the largest trees contained the most quinine. One hundred of the largest trees in each of two plots were sampled and analysis showed that only ten per cent. of the samples contained less than 5 per cent. quinine sulphate, whilst ten per cent. contained more than 9·8 per cent. and one sample gave 14 per cent. Seed of fifteen selections was sown in nursery beds at Kawanda with satisfactory results.

Animal Husbandry and Pasture Investigation.

The systematic weighing of stock at Serere enabled the response of individual animals to varying conditions of pasture to be followed with accuracy. The abnormally severe dry season impoverished grazing generally, making it necessary to vary stocking rates, which had previously been satisfactory, and to feed heavy supplementary rations of silage and cotton seed in order to maintain the condition of stock. Preliminary indications from grazing trials at Serere were that rough grazing lands benefitted from being allowed to seed in the wet season once in every two or three years. The most satisfactory management of resting leys on good land was rotational grazing with a thirty day cycle. The extreme annoyance caused by biting flies (*Stomoxys*) to cattle at Kawanda so restricted their grazing that they lost condition. The dairy herd was therefore housed whilst the sun was up, and the flies most active, and was put out to grazing at all other times. At both Serere and Kawanda, milk obtained in excess of calves' requirements was recorded. Preliminary observations indicated the great variation in milk yield in local stock and suggested that a large increase in average milk production would result from simple selection, apart from improvement by breeding.

Stall feeding of store cattle for the Kampala market continued to give good results. Not only was a profit made, but the meat was incomparably better than that from trade stock killed straight from the road. In addition, valuable supplies of kraal manure at the rate of four-and-a-quarter tons per ox per annum were made. The bulky fraction of the stall feeding ration consisted of cut elephant grass (Pennisetum purpureum). The grass was cut rotationally every four months and it was found that heavy applications of kraal manure doubled the yield of grass; manured plots produced approximately thirty tons of succulent feed per acre sufficient to provide the roughage content of the fattening ration for 6 beasts per annum. At Ngetta, crops taken after grazed leys have given consistently higher yields than those succeeding leys which were not grazed, although the differences in yield have not been statistically significant. Furthermore, the grazed land was more easily ploughed and provided keep for stock at the average rate of one beast per acre.

A new piggery was built at Kawanda to house the pedigree herd of large black pigs. Sixty-four of the progeny were sold to Africans, the demand greatly exceeding the supply. Poultry, kept on open range systems, continued to thrive, and the losses due to predatory animals were more than compensated by the enhanced health and vigour of the birds. Over a thousand sitting eggs of pure Rhode Island Red and Austrolorp breeds found ready purchasers.

Rural Reconstruction and Soil Conservation.

Active dissemination of the doctrines of soil conservation was continued in all districts. Propaganda was directed both to fostering a fertility-conserving agriculture and to encouraging the adoption of measures to stop soil erosion. True strip cropping of annual crops was more widely practised in Buganda, particularly in Masaka. Other measures applied were small bunds or elephant grass hedges to control wash in permanent crops and the grassing of roadsides and house compounds. The contour narrow grass strip system for preventing soil wash made good progress in the Eastern Province, particularly in Teso, where it is rapidly becoming the normal practice.

The benefits of soil erosion control were seen by large numbers of visitors to the various demonstration centres throughout the country. In most districts, the layout and cropping of the land of one or more Mission centres was reorganised on sound lines, with special regard to erosion control.

Competitions arranged between Cultivators' Groups in Masaka and also between Gombololas in Bunyoro stimulated interest in soil conservation and improved agricultural practice generally.

In Lango, it was demonstrated that eroded grazing lands recovered rapidly if closed to grazing before erosion became severe. A few local stock owners co-operated in closing badly eroded areas.

Approximately 700 tons of compost, prepared from township wastes in Kampala, were delivered to African farms close to the town and applied largely to banana gardens having low soil fertility.

Soil Structure.

Estimations of crumb content of soils confirmed that at Serere no increase in crumb percentage resulted from applications of farmyard manure. The operation of digging in a green legume definitely reduced the crumbs. Crumb regeneration of soils, resting under various species of grasses, was investigated at Kawanda and a number of species were found to be effective soil improvers. There were indications that "sticky point" determination of soils might provide a measure of their relative crumb structure potentials. Analyses of crumb content of virgin soils may in time permit of a table being drawn up of optimum crumb percentages of all the soils in the Protectorate, on which advisory work on grass rotations could be based.

Education.

Short courses for schoolmasters, chiefs and cultivators were given both at Serere and Bukalasa. Seventeen apprentices were at Serere in training to become Agricultural Instructors in their various districts. Forty Farm Learners attended courses of instruction at Bukalasa throught the year. Twenty-five of these were selected for posts as Agricultural Instructors or Headmen, the remainder departing to farm their own land.

Six Makerere Students received their final training at Serere. Four of these were from Tanganyika Territory, one from Zanzibar and one from Uganda.

Ten Rural Assistants began their training at Serere and provision was made for a further twenty to receive instruction at Bukalasa. A number of articles of agricultural interest prepared by the Agricultural Officer (Soil Conseration) were published in the local press.

Miscellaneous.

Throughout the year, Field Officers were actively engaged in maintaining production of primary produce at the highest possible level and with supervising its marketing. In 1944, they participated in the organisation and execution of famine relief measures by the utmost encouragement of food planting and in supervision of food issues.

The Senior Economic Botanist performed the duties of Rubber Controller and was Chairman of the Rubber Production Committee until the middle of February, 1944. The Senior Plant Pathologist acted in an advisory capacity to the sugar industry.

LEGISLATION.

Under the Defence (Controlled Produce) Regulations, 1942, the Marketing of Maize Order was enacted in July, 1943, to regulate the marketing and disposal of maize and to ensure that all exports attained a standard quality.

The Defence (Controlled Produce) Regulations of November, 1943, replaced the similar Regulations of 1942, and provided the Director of Supplies with wide powers over the marketing and processing of all important foodstuffs produced in Uganda. The Director of Supplies delegated his functions under this Regulation in large measure to the Director of Agriculture.

The Defence (Cotton Control) Regulations of December, 1943, revoked the earlier Control of Cotton Regulations and established a Cotton Exporters' Group empowered to act as the Agent of Government in selling Uganda lint cotton according to the directions of the Director of Supplies.